

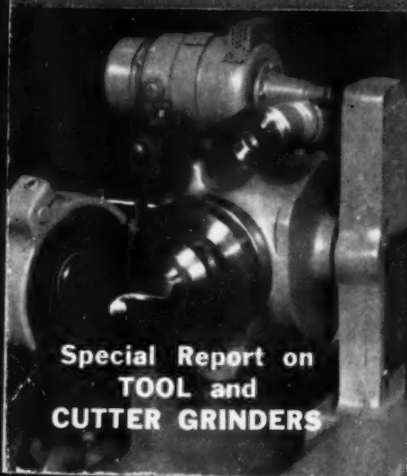
*Machine
and Tool*



BLUE BOOK

ESTABLISHED 1906

APRIL 1953



**Special Report on
TOOL and
CUTTER GRINDERS**

**Skillful Design of Double,
Triple Leaf Drill Jigs**

The Right Rivet for the Right Job

More Production from Your Reamers

Last Minute Washington News

"Know-How" Reference Sheets

CONTENTS ON PAGE 5



...but
Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

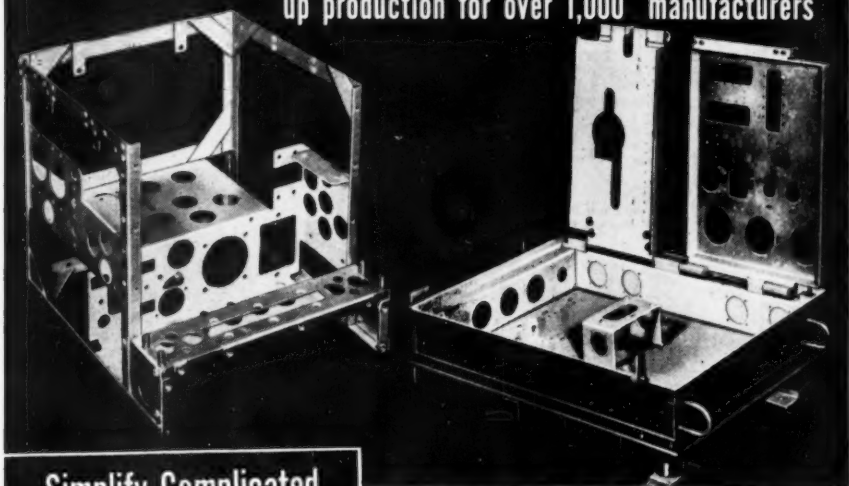
There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate—without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!

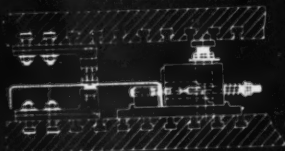


ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Ave. • Chicago 39, U. S. A.

Whistler Adjustable and Magnetic Perforating Dies are stepping up production for over 1,000 manufacturers



Simplify Complicated Piercing Operations



Use this HU-50 90° Perforating Unit on the same job with other Whistler Dies... often saves extra press operations.

USE WHISTLER Adjustable and Magnetic Dies for perforating, notching and slotting sheet metals...fast, accurate and cost cutting. Complicated patterns can be set up quickly. Hole arrangements can be changed in the press...without waiting and at no extra die cost. New HU-50 units, that pierce at 90° angle, can be used in conjunction with standard perforating equipment. Fewer press operations are necessary.

Re-use the same dies in different arrangements on many jobs. Punches and dies are interchangeable.

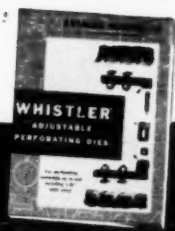
Whistler Adjustable Dies can be used in practically every type press. Standard sizes and shapes of punches and dies available up to 3 inches. Special sizes and shapes to order.

S. B. WHISTLER & SONS, Inc.

760 Military Road
Buffalo 23, New York



For prices and application data on this modern way to speed production and cut unit costs, write for these illustrated Whistler catalogs.



for **SECOND OPERATION WORK**

Wade [®] **FAST ECONOMICAL No. 7 HAND SCREW MACHINE**

This Wade No. 7 Hand Screw Machine is designed for fast, economical production. Especially well-suited for close tolerance work. Cut-away case-hardened steel tool blocks permit the operator to get tools closer to the nose of the spindle to hold closer tolerances. Quick-acting collet closer makes easy and speedy chucking, and fast removal of work. Wide range of spindle speeds.

Spindle speeds, 315 to 3300

**1" collet 4 - to - 1 Hi - Lo Speeds
at finger tips.**

**Spindle stops without
stopping motor.**

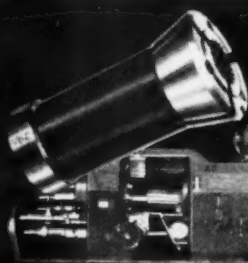


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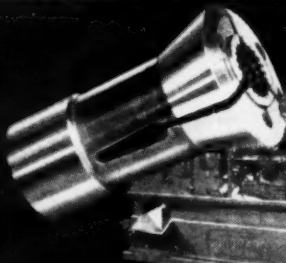
THE WADE TOOL CO., 51 River St., Waltham, Mass.

HARDINGE
ELMIRA, N.Y.

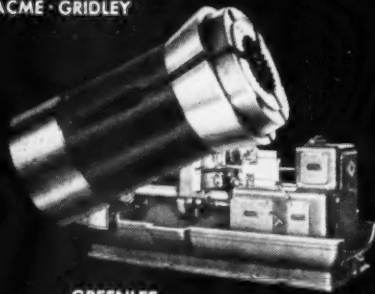
Master Collets and Pads for MULTIPLE SPINDLE AUTOMATICS



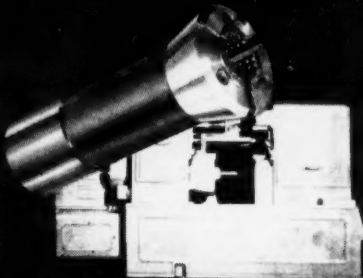
ACME-GRIDLEY



CONE



GREENLEE



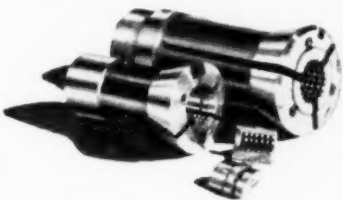
NEW BRITAIN

Equip your multiple spindle automatics with HARDINGE Master Collets and Pads—for solid collet performance at low cost.

Available for the following machines up to and including 3 1/2" capacity: Cone; Greenlee; Gridley and Acme-Gridley; National Acme and New Britain.

- o Size changes permitted without removing collet from Spindle.
- o Final tightening possible for pads when closed on bar stock.
- o Lower cost—compare pad price with solid collet, and you will standardize on Hardinge Style "S".
- o Design affords maximum strength.
- o Greater accuracy — because pads are ground accurately on an arbor.
- o Lower inventory possible — pads interchangeable among different makes of automatics with similar capacity.

Hardinge Style "S" Sure Grip Master Collets and Pads



Write for Style "S" Bulletin—contains complete descriptions, specifications, and ordering information.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

ARMSTRONG WRENCHES



Choose Your Wrenches as you do your friends--for life

Specify ARMSTRONG Wrenches for lifetime service, for finely balanced tools that feel right in the hand and make work easier, faster and less fatiguing. ARMSTRONG Wrenches generally are longer for size—give greater leverage. Accurately milled or broached openings give the proper clearance. They are safe wrenches because they are strong beyond need.

Drop forged and machined from high tensile carbon or special alloy tool steels, ARMSTRONG Wrenches are heat treated, tempered and tested to an exact balance of toughness, hardness and tensile strength. Each is beautiful in finish and line, is a quality tool to be proudly possessed by any mechanic—or certain to "give a lift" to any assembly line. Buy wrenches which carry the trade marks HI-TEN or ARMALLOY. On carbon or alloy steel wrenches these trade marks are your guarantee of lifetime quality.

WRITE FOR CATALOG



ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5208 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

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Hitchcock Managers are Listed on Page 64

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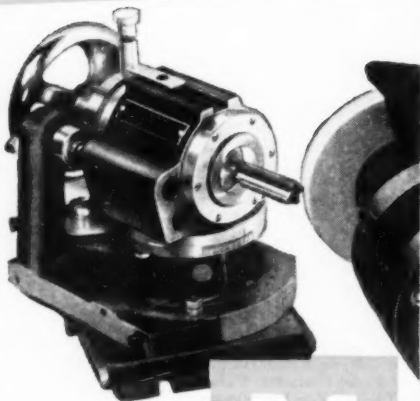
RELIEVES TAPS • RELIEVES COUNTERBORES • RELIEVES SPHERICAL CUTTERS

RELIEVES FORM TOOLS • RELIEVES CENTER DRILLS

What a relief! ...RADIAL relief!

**FOR MORE CUTS PER
GRIND and BETTER
CUTS — SHARPEN
STRAIGHT and SPIRAL
TOOLS WITH D • S**

By actual user experience, radially relieved tools have outlasted tools with standard angular relief by as much as 5 times. They cut freer and better. D.S. is readily set up and radial relief can be produced by any good grinder hand without special experience. Hundreds of these fixtures are now in use.



D • S RADIAL RELIEF GRINDER

Blade is relieved eccentrically leaving all possible metal behind cutting edge for support.



Any amount of margin, parallel with cutting edge, can be left if desired on either straight or spiral tools.

**NEW
HOME
OF
D • S**

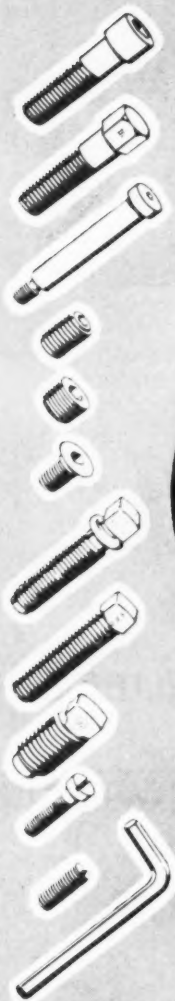
WRITE FOR OUR CATALOG



**D • S GRINDER DIVISION
Royal Oak Tool & Machine Co.
Stephenson Hyway • Royal Oak, Mich.**

RELIEVES BORING BARS • RELIEVES HOLLOW MILLS

RELIEVES PROFILE MILLS • RELIEVES REAMERS • RELIEVES STEP DRILLS



STRENGTH WITHOUT BULK

Exceptional strength of Mac-it Screws permits use of smaller, lower cost fastening screws.

PRECISION FASTENERS

Quality control provides all Mac-it Screws with high dimensional accuracy and uniformity—for class-3 fit.

MAC-IT SCREW ENGINEERING

Mac-it fastener engineering is available for screw design to suit all types of applications.

SPECIFY

Mac-it

**FOR ALL THESE
ADVANTAGES**

**ONE MAC-IT CALL
GETS 'EM ALL!**

SPECIAL SCREW PRODUCTS

Mac-it is geared for small or large runs of screws with special design or strength characteristics.

HEAT-TREATING

Mac-it high-quality steel and heat treat process insure full toughness throughout all Mac-it Screws.

DISTRIBUTOR SERVICE

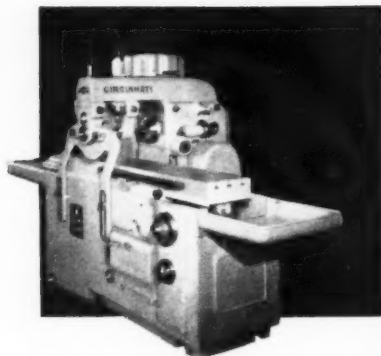
Hundreds of distributors from coast to coast insure prompt attention to all screw requirements.

MAC-IT SCREW DEPARTMENT

STRONG, CARLISLE & HAMMOND COMPANY

1392 W. 3RD. STREET • CLEVELAND 13, OHIO

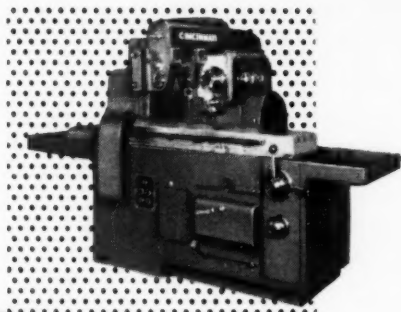
Manufactured by Mac-it Parts Co., Lancaster, Pa.



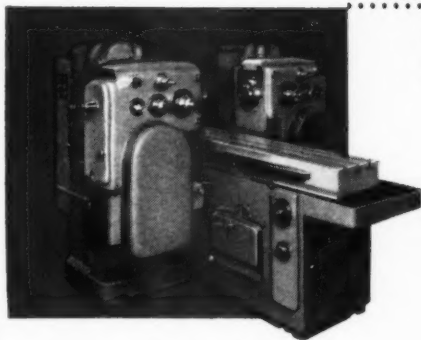
Plain style, new CINCINNATI
No. 2-24 Automatic
Milling Machine

a **new** milling machine
bearing a world renowned name

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES



Plain Rise and Fall style,
new CINCINNATI No. 2-24
Automatic Milling Machine



Duplex style, new CINCINNATI
No. 2-24 Automatic
Milling Machine

CINCINNATI . . .

You can always look to Cincinnati Milling for the finest in machine tools. Cincinnati's newest is the No. 2-24 Automatic, an outstanding example of fine engineering and workmanship, combining advanced production features and easier, more convenient means of setting up the job. ¶ There are three styles: Plain, Duplex, and Plain Rise and Fall. All have two-way table feed cycles with cycle selector control; automatic backlash eliminator; automatic spindle stop; Dynapoise overarm. You may obtain complete information by writing for 28-page catalog No. M-1760. Brief data in Sweet's Catalog File for Mechanical Industries.

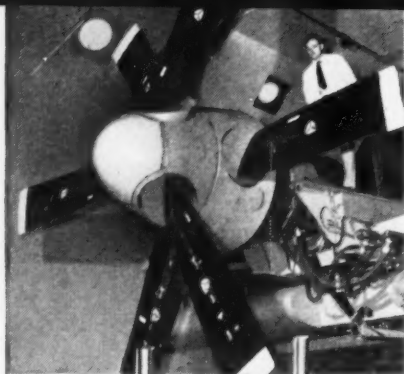
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



OPTICAL PROJECTION PROFILE GRINDERS - CUTTING FLUID

April, 1953

CINCINNATI



High speed aircraft propeller on test stand—built from tools "spotted in" in a DANLY SPECIAL DIE SET.

DANLY SPECIAL DIE SET, 46 by 140 inches, used for both production and checking of aircraft propeller tools.



DANLY SPECIAL DIE SETS



Final checking of a brazing fixture after "spotting in" to the master. A bridge gage is used with a series of templates as shown.



DIE SETS AND DIEMAKERS' SUPPLIES

DEPENDABLE FOR ACCURACY

Here's proof . . . this Danly Special Die Set is used by one of the country's leading aircraft propeller manufacturers for "spotting in" all contour tools for a complete production line. Accuracy is a must because the tools, masters for duplicating planers and profilers as well as holding fixtures, must mate closely with the master pattern and with each other in the sequence of operations.

Dependable accuracy makes Danly Special Die Sets ideal for applications of this kind . . . and rugged construction makes them last longer, too, on any job. That's why leading diemakers everywhere prefer Danly Die Sets!

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue • Chicago 50, Illinois

**DANLY SPECIAL DIE SET SERVICE
IS FAST AND CONVENIENT—CALL
YOUR NEAREST DANLY BRANCH**

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- CLEVELAND 14.....1550 East 33rd Street
- DAYTON 7.....3196 Delphos Avenue
- DETROIT 16.....1549 Temple Avenue
- GRAND RAPIDS.....113 Michigan Street N.W.
- INDIANAPOLIS 4.....5 West 10th Street
- LONG ISLAND CITY 1.....47-28 37th Street
- LOS ANGELES 54 Ducommun Metals & Supply Co.,
4890 South Alameda
- MILWAUKEE 2.....111 East Wisconsin Avenue
- PHILADELPHIA 40.....511 W. Courtland Street
- ROCHESTER 6.....33 Rutter Street

*Indicates complete stock



...delivers high production-low cost carbide planing!

Here's high production — low cost carbide planing
at the Beloit Iron Works, Beloit, Wis.

This GRAY OPENSIDE PLANER CUB is running
300' per minute, day in — day out, carbide
planing packing strip holders for suction
rolls of paper making machinery.

Planer jobs don't grow old on a GRAY!

Ever see a planer running wide open,
day after day at 300' per minute? That's
the pace of a new GRAY — the pace that
makes your old planer look really old.

Why should you be interested?

Because a GRAY CUB is not only an econom-
ical initial investment — it also insures
substantial savings in time and money thru its
high speed, accurate production ability.

BETTER BE QUICK!

or the job will be finished
before you turn the page!

Write today—get the story on GRAY
HIGH LOW COST PRODUCTION

The G.A. **GRAY** *Company*

planers • milling planers
planer type milling machines
horizontal boring machines

CINCINNATI 7, OHIO, U.S.A.

SOLD IN CANADA BY UPTON, BRADEN AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

QUALITY PERFORMANCE AT LOW COST

WITH PRECISION MADE **ROYAL** TOOLS

Good workmanship and fast, economical production depend on good tools. Royal Tools pay off from the very first moment you use them in

your shop or plant production line. Compare performance and costs and you will specify 100% guaranteed Royal Tools.



EMPIRE LIVE CENTERS

Morse tapered 1 to 7; Jarno, B. & S., str. shanks, specials in various sizes.

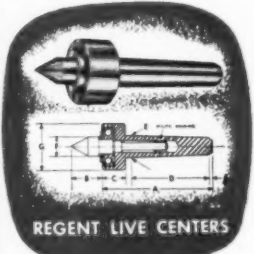
Six interchangeable points • Tapered seat • Very short overhang • Pre-loaded heavy duty bearings • Hardened and ground tool steel points • Accuracy of $\pm .0001$ • Available in toolmaker's case



REGAL LIVE CENTERS

Sizes 1 to 5 M. T.

Three interchangeable points • Replaceable parts and bearings • Hardened and ground points • Precision combination bearings • Positive bearing seal • Sturdy, medium duty tool • Handles large variety of lathe, grinding and milling jobs



REGENT LIVE CENTERS

Sizes 1, 2 and 3 M. T.

Small diameter head • Shorter overhang • Accurate to .0001 • Free-turning point revolves with smallest parts where point of average live center will not turn • Minimum deflection due to rigid, one-piece point • Oilite bearing and ball bearing



ROYAL TOOL POST TURRETS

2 1/4", 3 1/4", and 4 1/4" square

Twelve positions • Re-indexes to closest measurements • All working parts hardened • Simplifies and cuts set-up time • Achieves greater productivity and accuracy • Fully protected against dirt and chips • Fits all lathes



ROYAL COLLETS

Spring Type: Finest, select steels • Properly heat treated and precision ground • Hard jaws • Styles 3C, 3AT, 5C, and 6AT.

Step Type: 3" in diameter • Machineable for multiple steps or desired diameters • Holds work firmly • Styles 3C, 3AT, and 5C.



ROYAL DRAW BARS

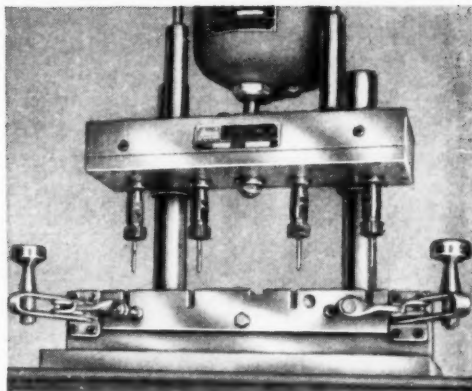
Complete with Collet Sleeve

Precision-built and engineered hand-wheel type • Extremely accurate • Sturdy construction, finest quality workmanship and materials • Polished maple handle • Hollow torque tube extends through spindle • 1/2" capacity for all popular lathes

See your local distributor or write today for literature.

| | | |
|--|---|--|
| <p>Complete Stock Also Carried in:</p> | | |
| <p>LOS ANGELES 3425 SANTA MONICA BLVD. LOS ANGELES 38, CALIFORNIA</p> | <p>CHICAGO 547 W. RANDOLPH ST. CHICAGO 6, ILLINOIS</p> | <p>ROYAL PRODUCTS 87 UNION STREET MINNOLA, NEW YORK</p> |

**For
Multiple
Tapping
and
Drilling ...**

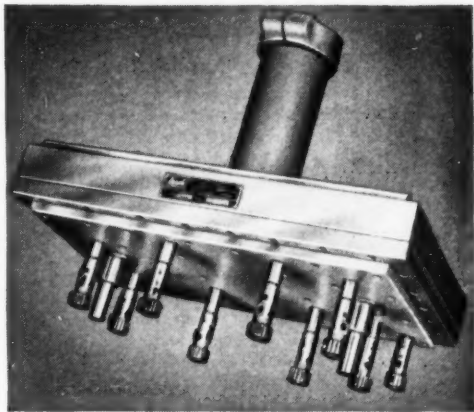


AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

Jarvis MULTI-TAPPERS

Engineered and built to your specific production requirements from our basic standard components, Jarvis Multi-Tappers can be furnished for any type of drill press available.

We invite your inquiries—let us assist in analyzing your tapping and drilling needs!



Send for our catalog
featuring
Jarvis Multi-tappers

NEW FEATURES OF JARVIS MULTI-TAPPERS

include:

- Aluminum case—Jig bored.
- Gear driven—positive action, silent drive.
- Ball bearings throughout.

WHEN POWERED WITH A JARVIS TORQOMATIC DRIVE THE JARVIS MULTI-TAPPER PROVIDES THE MOST EFFICIENT AND PRODUCTIVE MACHINE IN THE FIELD.

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT



Here's how to Balance Your Milling Production

use **VAN NORMAN RAM TYPE MILLERS**

An important advantage of the Van Norman Ram Type Miller is its ability to meet daily fluctuating milling requirements. For example, one period may call for horizontal milling and another angular or vertical. By simply positioning the adjustable cutterhead and moving the ram, the operator is ready for the particular job.

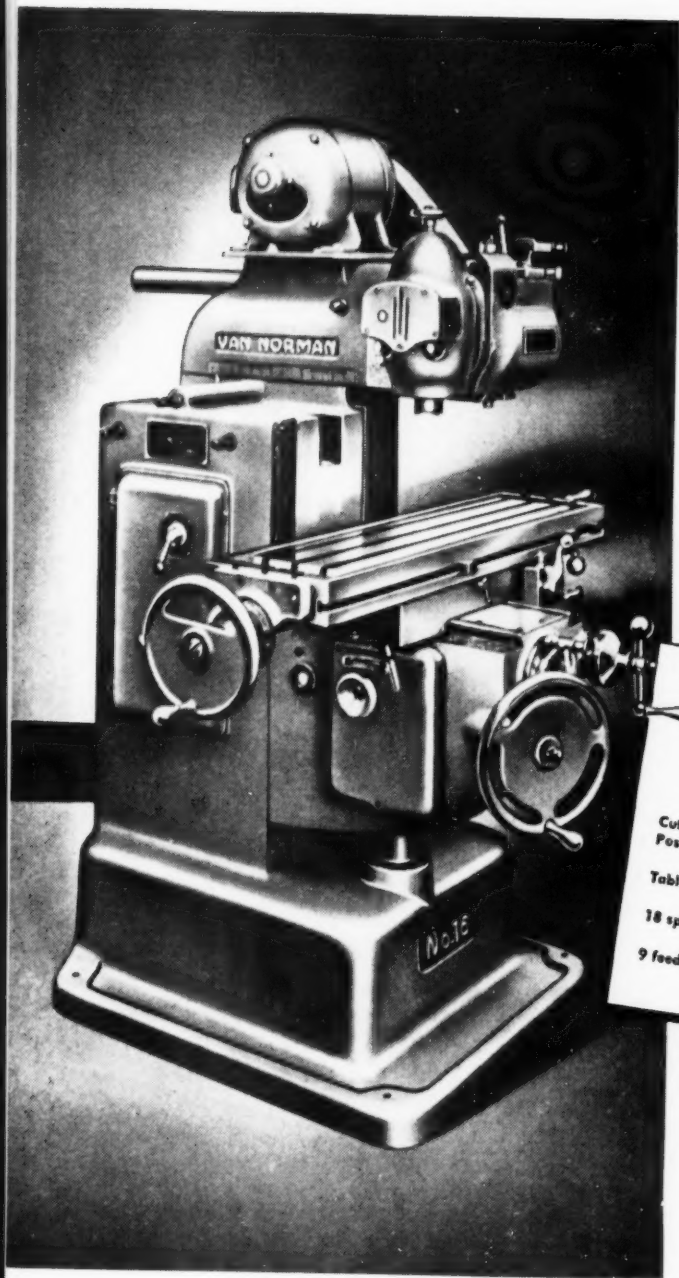
Van Norman Ram Type Millers enable you to meet all milling jobs and keep all machines operating, saving you money by

eliminating idle machine time so often encountered with single purpose machines. These advantages multiply if you have a number of Ram Type milling machines in use.

In addition, the adjustable cutterhead cuts idle machine time caused by work re-set-ups by as much as 50%. Because the work stays in the original set-up, errors are eliminated, accuracy improved.

Find out how you can save with these versatile millers. Write for catalog, today.

VAN NORMAN COMPANY
SPRINGFIELD 7, MASSACHUSETTS, U. S. A.



SPECIFICATIONS

No. 16

Ram Type Miller

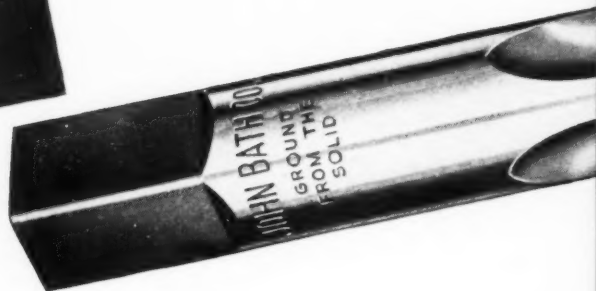
**Cutterhead in Vertical
Position**

Table: 37" x 9½"

18 speeds: 50 to 2000 RPM

9 feeds: 0.6 to 16 in. PM

TAP-ODDITIES



Pete had a happy thought one day
As he picked his favorite brand.
"Let's fix Bath Tap selection
So the job will go as planned!"



Now — each worker draws a slug
To fit the right job number.
And always gets the right Bath Tap
Plus — the very latest rhumba!

Jobs that are properly set up, always specify the pre-determined type of Bath Tap to be used for the best threading results.

Many factors affect this selection. There's the type of hole to be threaded, the type of machine to be used, the holding device, the class of fit required, lubrication — but most important, the kind of metal to be worked. Many times, this last factor is not given proper consideration, resulting in poor threads and reduced tap efficiency.

For example, because of abrasive action, ground thread taps with surface treatment are best for cast iron. Bath Taps for threading brass and copper are designed with specific hook and relief for these materials. Steels require proper flute selection and the correct grind such as Bath type "R" taps for tough stainless and high temperature alloys.

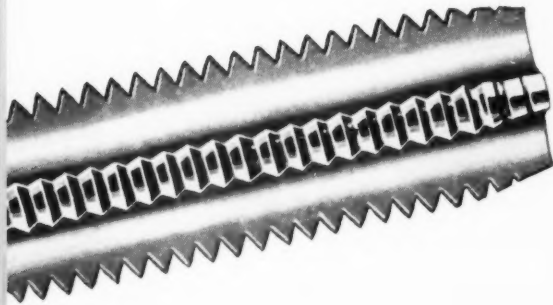
Why not let our engineers help you select the proper type of Bath "ground from the solid" Taps — for that next job? Your inquiry will be given prompt attention.

INSIST ON BATH TAPS
— PROFIT BY THEIR
PLUS — PERFORMANCE



PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED
14 Grafton St., Worcester, Mass.



**When you want
on any cutting-tool**

here are 5 reasons to call your

MORSE- Franchised DISTRIBUTOR



1 **COMPLETE LINE:** Drills, Taps (including a new line of Special-Purpose Taps . . . and 7 new basic and conversion sets of Taps and Dies, handsomely boxed), Dies, Reamers, Cutters, End Mills, Counterbores and Countersinks.

2 **AMPLE STOCKS:** Your Morse-franchised Distributor is ready to supply you with the Morse Quality Cutting Tools you need. *New Morse methods of production, inventory control and expediting put him in a far stronger position in '53 than ever before.*

3 **ON-THE-JOB EXPERIENCE:** Your Morse-franchised Distributor knows his way around on cutting-tool applications, to give you *increased production and reduced costs.*

4 **CLOSE CO-OPERATION FROM MORSE ENGINEERS:** On any "cranky" or special problem, your Morse-franchised Distributor can immediately summon the help of Morse's top technical men.

5 **PROVEN RESPONSIBILITY:** Your Morse-franchised Distributor is a respected member of your business community. You can have full confidence, *as Morse has, in him and his men.*

**THAT'S WHY IT'S ALWAYS GOOD BUSINESS TO
"CALL YOUR MORSE-FRANCHISED DISTRIBUTOR"**

MORSE TWIST DRILL & MACHINE COMPANY, NEW BEDFORD, MASS.

(Division of VAN NORMAN CO.)

Warehouses in New York, Chicago, Detroit, Houston, San Francisco



ACTION!

problem . . .



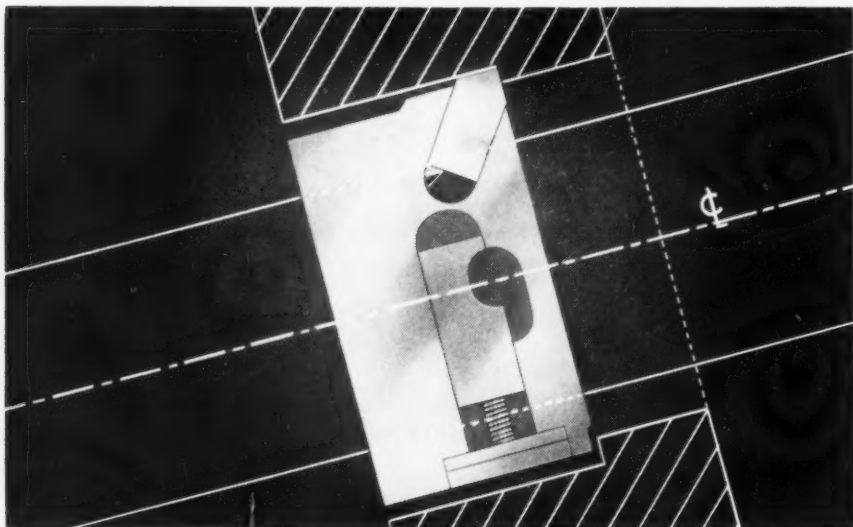
MORSE-FRANCHISED DISTRIBUTOR

MORSE

Cutting Tools

*Buy them by phone
from your Morse-Franchised
Distributor and save
ordering time*

Get fast, positive line boring accuracy for 2½" to 17" dia. with . . .



DAVIS SINGLE CUTTER MICROMETER ADJUSTABLE BLOCKS

HERE'S the way to boost efficiency on general purpose jobs that demand rigidity and a wide range of cutter adjustments.

In addition to regular line boring with either standard or special bars, Davis tools with the exclusive adjustable feature are easily adapted to counterboring, undercutting, grooving, facing or chamfering. Block and cutter adjust as a unit to assure full cutter support at all settings.

Made of high grade tool steel, hardened and ground, the blocks can be furnished with High Speed Steel, Cobalt, Stellite, Tungsten Carbide tipped or Tantalum Carbide tipped cutters.

For details, write for bulletin No. 602.

If Davis can't bore it, it can't be done!

DAVIS BORING TOOL DIVISION

GIDDINGS & LEWIS MACHINE TOOL CO., FOND DU LAC, WISCONSIN

Builders of plain and micrometer adjustable block type boring tools; line boring bars; special boring tools; car wheel boring tools; planer, vertical boring and turning mill tools; Quick Change arbors and sleeves.

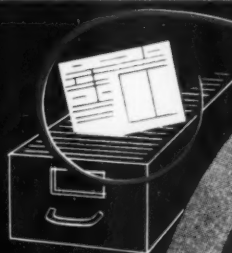


See us at the Canadian International Trade Fair—Toronto, June 1 to 12

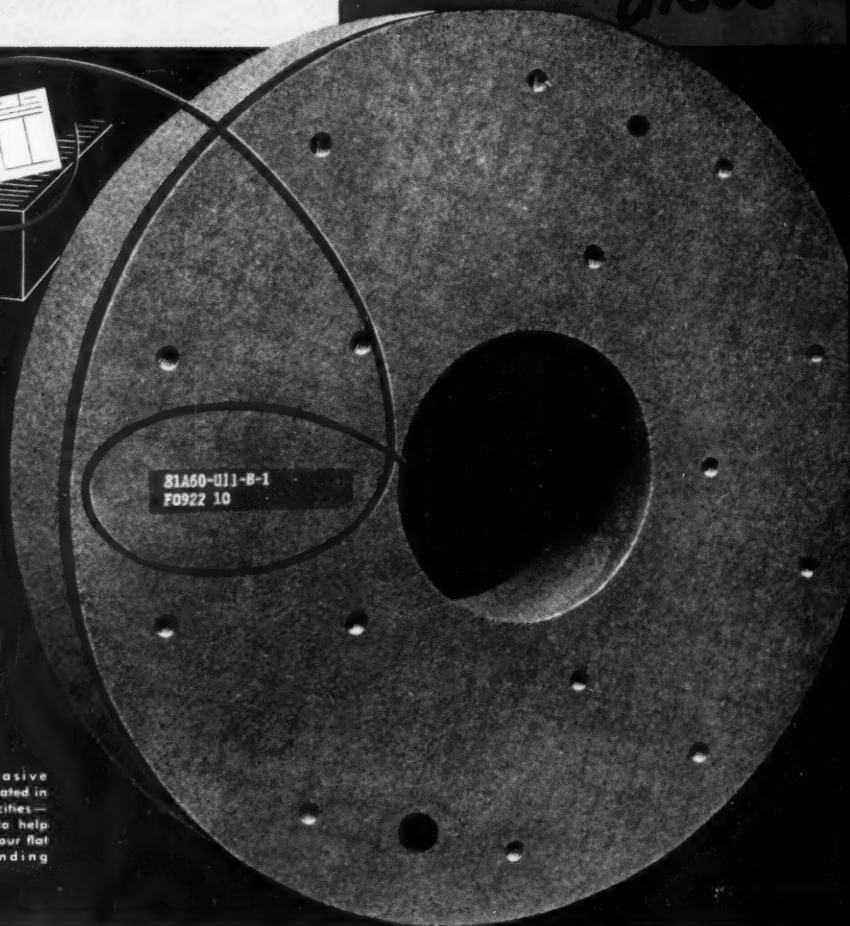
**Customized
Abrasive Discs
Fitted To Your
Grinding Needs**

GARDNER

*abrasive
discs*



Gardner Abrasive Engineers—located in all principal cities—will be glad to help you with all your flat surface grinding problems.



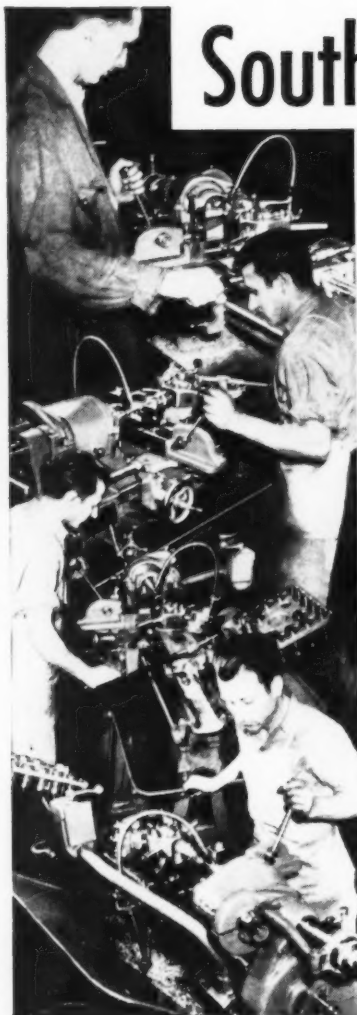
Send for Gardner Abrasive Disc Guidebook for better surface grinding results.



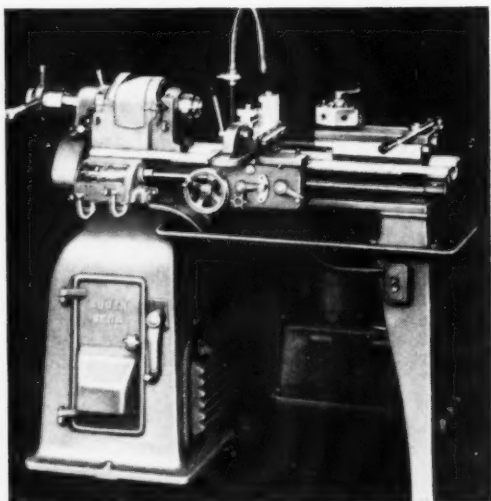
Gardner varies abrasive type, grain size and structure until you get the *best* abrasive to meet your job requirements. You get a Gardner Customized Abrasive that meets your needs for production, stock removal, finish, tolerance. Once your specific formulation is determined, the card record goes into our permanent file. Grinding results on reorders will be duplicated because your specific abrasive formulation has been duplicated.

109 A5

GARDNER MACHINE COMPANY
428 East Gardner Street • Beloit, Wisconsin, U.S.A.



South Bend ¹⁰⁰⁰ TURRET LATHE



Cost-Cutting Versatility

This precision turret lathe will cut your machining costs on small parts. Built-in accuracy, ease of operation and a wide range of speeds and feeds insure high production and close tolerances. Practical attachments simplify tooling for jobs which might otherwise require special fixtures. Find out how this versatile turret lathe can improve your machining — *send coupon now.*

SPECIFICATIONS

| | |
|--|-----------------------------|
| Swing 10 $\frac{1}{8}$ " | Power longitudinal feeds |
| Turret to spindle . . . 19 $\frac{3}{8}$ " | 480015" to .0836" |
| Collet capacity 1" | Power cross feeds . . . 48 |
| Spindle bore 1 $\frac{3}{8}$ " |0006" to .0309" |
| Spindle speeds 12 | Thread cutting feeds . . 48 |
|55 to 1400 r.p.m. |4 to 224 per inch |



SOUTH BEND LATHE

South Bend 23, Indiana
Building Better Tools Since 1906

Send Information Checked:

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10" to 16-24" FLOOR LATHES

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$\frac{1}{2}$ " and 1" Collet TURRET LATHES

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14" DRILL PRESSES

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Select...

*the RIGHT DRILL
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from the **W&B** Complete Line

Many years of scientific research, valuable experience and engineering knowledge have dictated the perfected designs and proper materials now incorporated in the complete line of Whitman & Barnes drills. There are individual drill designs and materials for producing best possible results when drilling ferrous and non-ferrous metals, plastics, glass, wood, stone, etc.

For faster, better and more economical drilling of holes in any material it will pay you to select a Whitman & Barnes drill that is specifically designed for the application.



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Presents

outstanding design features:

Double End Twin Drive with double reduction gearing (for straight bends and smooth power application.)

A rigid One-piece Frame with permanently welded crown for minimum deflection and permanent alignment.

Laminated Non-Metallic Ways maintain accurate alignment and assure longest life of dependable service.

Deep Twin Plate Steel Bed with open slug clearance for multiple punching work.

Powerful Air Cooled Friction Clutch and Brake assures easy ideal "Press Brake Action".

Air Electric Clutch Control may be operated by palm buttons on ram or foot switch with provisions for "Inching", "Single Stroking" and "Continuous Run".

Reversible Flywheel can be pulled out of accidental stalls.

Power Adjusted Ram with self-locking adjusting screws.

Micrometer Dials accurately indicate position of ram so die settings can be quickly repeated.

Accessibility at rear with plenty of clear working space for safety.

Gages with full horizontal and vertical adjustment for front or rear of press.

Angle Support Brackets and Bolster Plates quickly convert press for stamping operations without affecting bending ability.

All gears operate in totally enclosed sealed baths of oil.

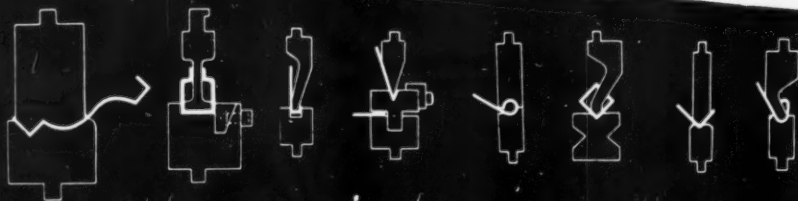
versatility of operations

| | |
|-------------|-------------|
| BENDING | JOGGLING |
| FORMING | NOTCHING |
| DRAWING | PUNCHING |
| BEADING | PIERCING |
| CURLING | PERFORATING |
| CORRUGATING | SLITTING |
| BLANKING | TRIMMING |
| EMBOSSING | ETC. |

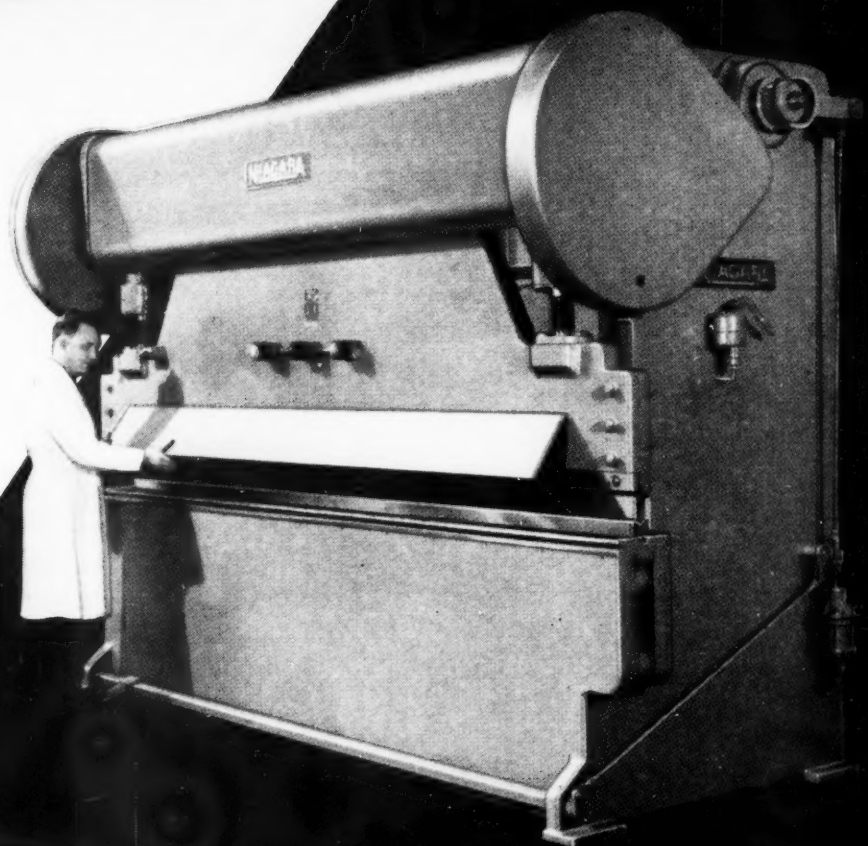
WRITE FOR BULLETIN 89



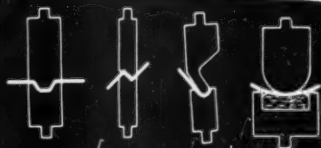
NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.



The Last Word in New All-Steel PRESS BRAKES

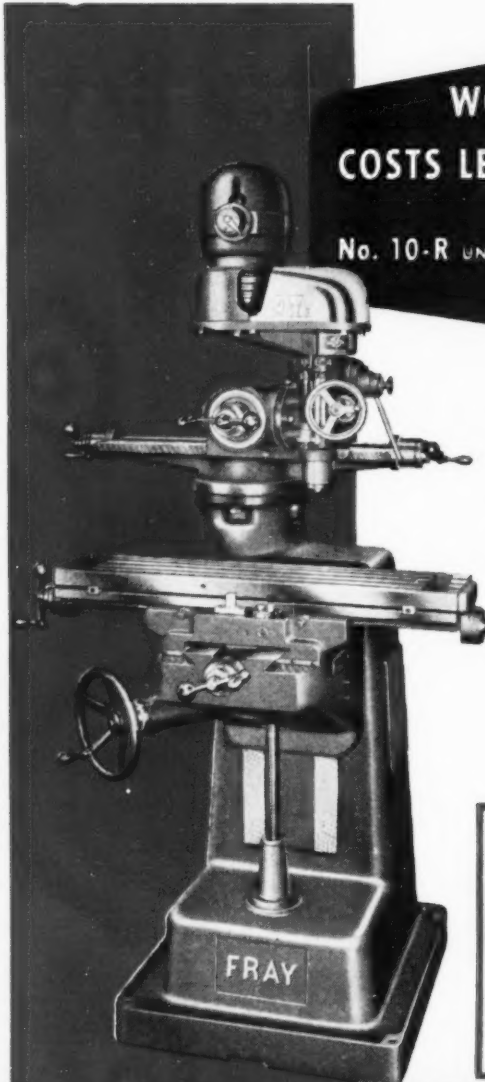


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*America's Most Complete Line of Presses, Shears,
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**WORK MOVES FASTER
COSTS LESS** with a *Fray*

No. 10-R UNIVERSAL RAM • TURRET TYPE • VERTICAL

MILLING MACHINE

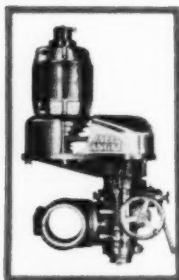
You get a wider work range than with any other machine this size. You can machine at any angle—vertical, horizontal or both. You can mill, drill or bore at any angle. Hence resetting isn't necessary. Just change the machine—changing is quick. (For vertical and regular horizontal milling, use the 10-RH.) Jobs are done faster and better ... at less cost. • It's Universal • Rugged • Easy to Operate.

A high precision tool.

Write for details and specifications.

Bulletin 10.

FRAY "ALL-ANGLE" HEAD TYPE 4



For deep, heavy cuts. Permits working to extra close limits. Any angle up to compound 2-way. Request Bulletin 4.



FRAY MACHINE TOOL CO.

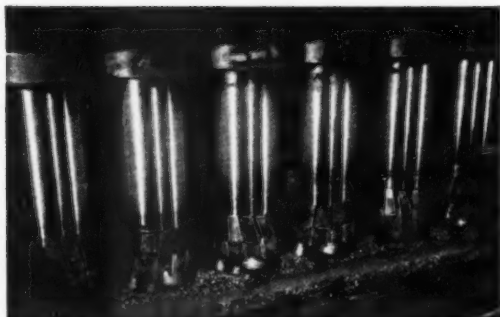
215 WEST WINGSBOR ROAD, CHILWELL, CALIFORNIA

OUNCES
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WESSONMETAL
CEMENTED CARBIDE!

TONS OF PRODUCTION!



ACTUAL JOB

Farm Implement Mfg. Co.

Machine.....Ingersoll Boring Mill—6 spindle
Part.....Cylinder block
Operation.....Rough cylinder bore
Tools.....3 R.H. and 3 L.H. Wesson Fine
Pitch Cutters—3.480 dia.—
12 Wessonmetal Solid G1 Blades
Speed.....148 S.F.M.
Stock Removal...3/16"
Feed......10" per min.—.063 per revolution
Length of Cut...8 1/8"

OVER 300% DOLLAR SAVINGS PER TOOL

OLD METHOD

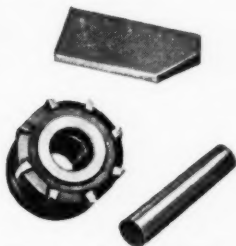
Pieces per Grind.....836
Cost of Tool.....\$49.68
Grinding Cost
per sharpening.....\$11.70
Tool Cost per 100 Pieces...\$2.588

NEW WESSON METHOD

Pieces per Grind.....3160
Cost of Tool.....\$172.80
Grinding Cost
per Sharpening.....\$8.78
Tool Cost per 100 Pieces...\$0.642

On only one machine with Wesson Tools Savings of over \$900 per year

HOW IS YOUR PRODUCTION SCORE CARD!



Write today for folder
on Wesson's
educational, full color,
sound movie—
"This Carbide Age."

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Outstanding Time Saver...

The New Cincinnati Electro-Magnetic Clutch and Brake alone brought a 30% time-saving here



The New Cincinnati Magnetic Clutch and Brake, with its single, convenient control lever, gives the operator the fastest, simplest and most accurate control of his Shaper and converts waste time into productive time.

This powerful clutch and brake requires no adjustment, and has a long, maintenance-free life.

Write for Cincinnati Shaper Catalog N-5.

Shaping time on 7 internal oil grooves in these steel sleeves was reduced from 12.5 minutes to 8 minutes, by the Cincinnati Electro-Magnetic Clutch and Brake.

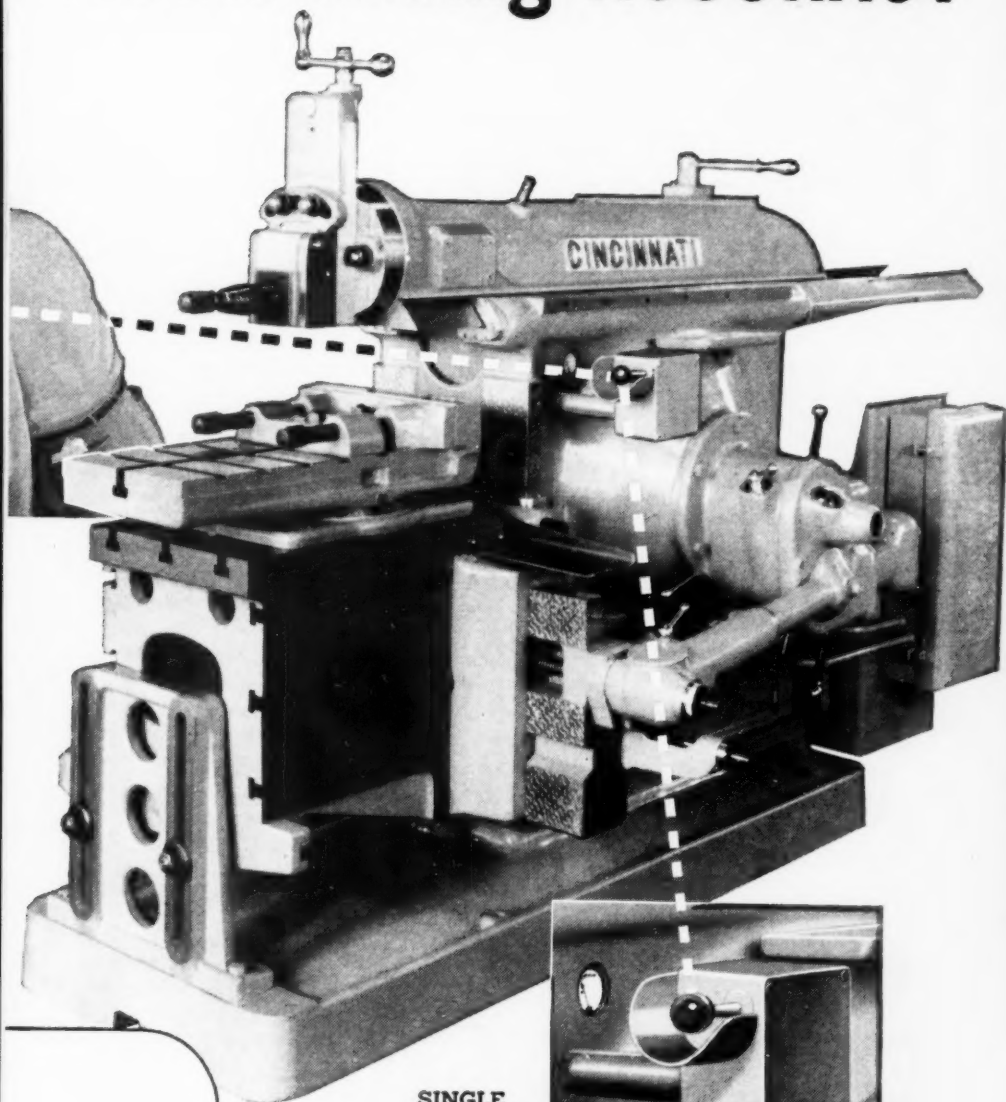


THE CINCINNATI SHAPER CO.

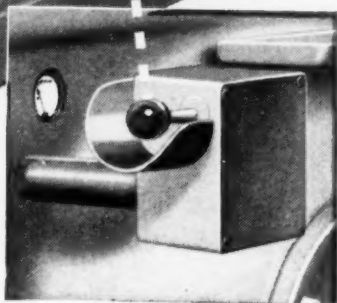
CINCINNATI 25, OHIO, U.S.A.

SHAPERS • SHEARS • BRAKES

...Outstanding ACCURACY

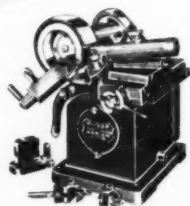


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At The First Sign of Dullness Sharpen Your Drills With **OLIVER DRILL POINTERS**

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ADRIAN**



Machine Grinding Is Best For
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More Accurate • More
Reliable — Do It The
Oliver Way

Your Drills Will

- cut faster
- last longer
- produce more accurate holes

It is important to remove twist drills from the drilling machine and replace them at the first sign of dullness. Better yet, allow them a certain number of hours production or a certain number of parts produced—then play safe •

protect your production run • sharpen them correctly on an Oliver Drill Pointer. Oliver Drill Pointers give balanced cut, with each lip doing equal work, eliminating the excessive drill costs and imperfect holes usually traced to improper drill grinding.

No. 510 for drills $\frac{1}{4}$ " to 3"—2-3-4 flute. Variable clearances. Variable point angles. Full automatic operation.

No. 21 Oliver Bench Grinder. Hand operated for Drills No. 57 to $\frac{1}{2}$ ". Right hand, with an improved point. Attachments are available for grinding oil hole drills, left hand and other special points.

Write for our free Booklet "How To Produce More Holes With Your Drills!"
See our catalog in Sweet's Directory

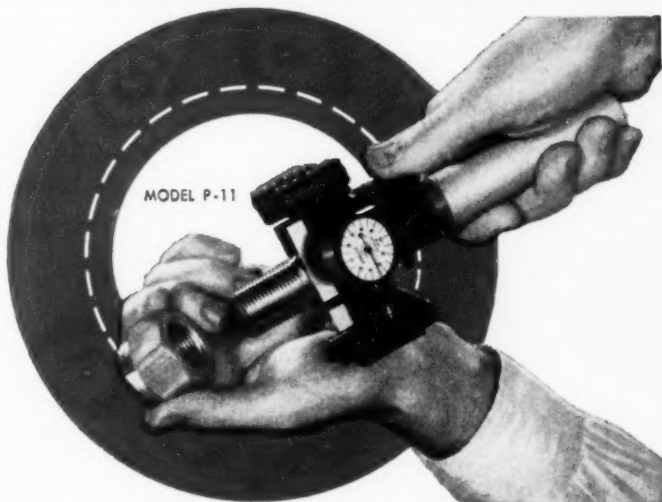
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1408 E. MAUMEE • ADRIAN, MICHIGAN

MACHINE TOOLS by OLIVER include:

AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
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TEMPLATE TOOL GRINDERS
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BRYANT INTERNAL THREAD GAGE



the revolutionary new gage for statistical quality control on internal threads

The P-11 is a portable comparator gage. A pair of segments, one of which is movable, quickly engage the mating part being inspected. Variation from basic size of P.D., form and lead are shown accumulatively on the dial indicator which reads in .0005". Interchangeable segments inspect all classes of internal threads from 5/16" to 5" dia. Descriptive literature on this gage and other Bryant thread gages is available by sending the coupon.

Bench type gages for external or internal threads are available, with or without squareness-of-face attachment.



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MAIL THE COUPON TODAY!

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Please send me illustrated folders giving full information on the Bryant Portable and Bench Thread Gages.

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VK Set No. 20 HS Thread Measuring Wires, accurate to $\pm .000025"$ for 20 common pitch Unified and American screw threads, 6 to 36 threads per inch.

The Van Keuren Catalog and Handbook No. 35 contains 91 pages of technical and engineering information on wire measurement of screw threads. This information, compiled from many years' research in the field, is available without charge by addressing: The Van Keuren Co., 177 Waltham St., Watertown, Mass.

The three-wire method is probably the best known and most widely accepted system of measuring pitch diameter of screw threads. Equipment required includes only a set of VK Thread Measuring Wires of proper diameter and an accurate measuring instrument.

Van Keuren Thread Measuring Wires have been developed over a period of many years of pioneering in the precise measurement field. They are made to National Bureau of Standards specifications, are held within .00002" for roundness, straightness and identity and to within .000025" of exact size.

VK Thread Measuring Wires are made of long-wearing, tough and beautifully finished high speed steel and are either $1\frac{7}{8}"$ or 2" in length. Every wire is subjected to the closest criteria in today's standards of accuracy.

In addition to set No. 20, shown here, VK furnishes many other standard sets as well as special wires in diameters from .001" to 1.500".



THE *Van Keuren* co.,

177 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carbide Cemented Carbide Plug Gages • Carbide Cemented Carbide Measuring Wires





2 UV VERTICAL MILL

Versatility plus

The TREE 2UV Vertical Mill combines rigidity and flexibility to make it one of the most versatile on the market today. The following features make it adaptable to a wide range of jobs:

- Fully universal milling head with power feed
- Dovetail type ram—360° movable turret
- Table—10 1/4" x 42"—power feed and rapid traverse
- Hardened and ground lead screws by Ex-Cell-O
- Ample range: 25" longitudinal, 11" transverse, 17 1/2" vertical travel
- Weight—2400 lbs.

Write for complete information . . .

TREE TOOL AND DIE WORKS

1600 JUNCTION AVENUE

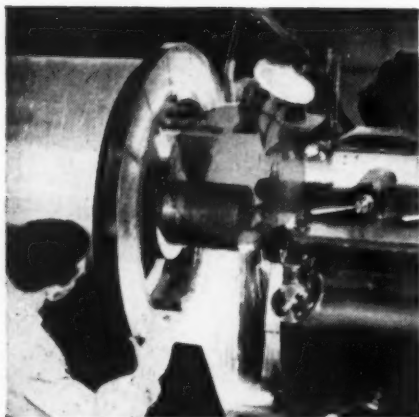
RACINE, WISCONSIN

Manufacturers of — MH-4 UNIVERSAL MILLING HEADS
TB-4 TAPER BORING TOOLS

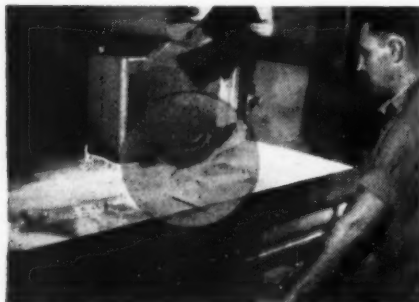
Now!...Boost your profits with the NEW

G BOND

for your latest Norton value-adding



YOU CAN SEE THE DIFFERENCE. The spark stream from a Norton G Bond ALUNDUM wheel is more continuous, more even, indicating uniformity of wheel structure and of cutting action.

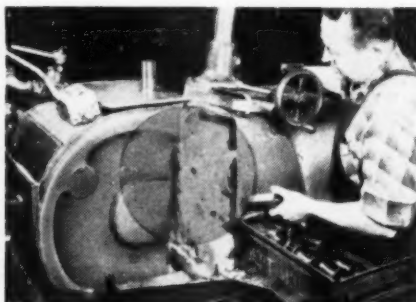


YOU CAN HEAR THE DIFFERENCE. Norton G Bond wheels grind with the pleasant, steady swish-h-h of free, easy cutting. You hear no harsh grinding noise.

After five years of continuous development and field-testing, Norton's new, exclusive G Bond — the most efficient vitrified bond ever produced — is now ready!

Secret of the new G Bond's great superiority is the way it holds each abrasive grain for maximum cutting action. Then, *just when it should*, it lets go, assuring a constant grinding surface of new grains with fresh, sharp cutting edges.

As a result, Norton ALUNDUM* grinding wheels made with the new G Bond have definite advantages that you can *see* and *hear* as they



YOU CAN PROVE THE DIFFERENCE. From general purpose to high production work, every job you do with the new G Bond wheels will benefit by the unique cutting action that grinds faster, freer and cooler.

"TOUCH OF GOLD"

grind — and that are *proved* by the more economical, more profitable work they do.

Make sure you add this new "Touch of Gold" to *your* grinding.

SEE YOUR NORTON DISTRIBUTOR

about arranging a test of one of the new G Bond ALUNDUM wheels in your plant. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

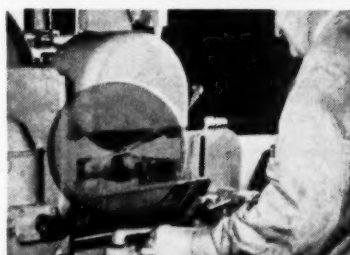
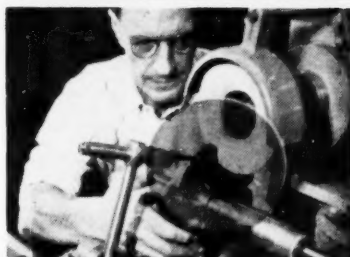
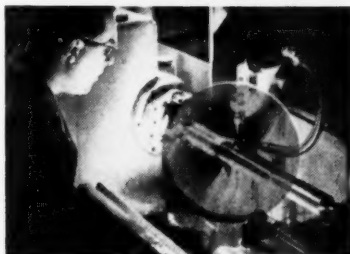
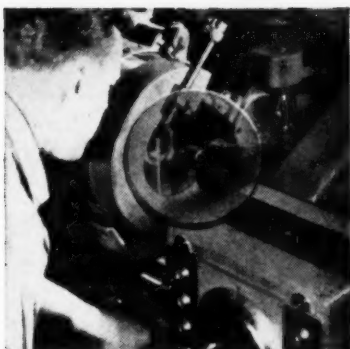
7 BIG ADVANTAGES

Norton G Bond ALUNDUM wheels:

- Do more work per wheel
- Cut freer, cooler, faster
- Dress easier — more pieces per dressing
- Cover a wider range
- Hold shape — better for form grinding
- Hold corners better
- Ideal for crush dressing

NORTON W-1476
ABRASIVES

*Making better products
to make other products better*



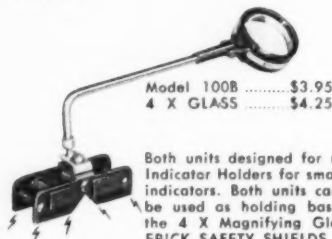
BROAD USEFULNESS. Norton ALUNDUM wheels in the new G Bond are best for such types of grinding as cylindrical, centerless, surface, internal, gear, tool and cutter, form and thread grinding, and saw gumming.

Cut **INDICATING TIME** On Machine Operations

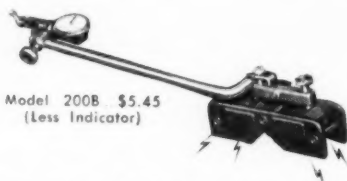
MAKE YOUR LIGHTING MORE FLEXIBLE • INCREASE WORKER SAFETY

Over 75,000 Customers are now doing just this by using one or more units of this complete line of ERICK MAGNA-HOLDER* Tools & Accessories. Magnetic Base Units are constructed with powerful, guaranteed lifetime Alnico magnets exerting a fifty pound pull! Eliminates time-consuming clamps and fixtures.

*Trade Mark

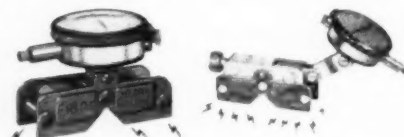


Both units designed for use as Indicator Holders for small test indicators. Both units can also be used as holding bases for the 4 X Magnifying Glass or ERICK SAFETY SHIELDS. Magnetic base grips firmly to fer-



Model 300.....\$2.95
(Less Indicator)

Designed for use with the larger test indicators for use as lathe stops, assuring fast accurate work in facing, turning, boring, etc.



Model No. 600 complete with 25 Watt bulb for concentrated light on close work, for layout, inspection, at saws and filing machines. Model No. 675 accommodates up to 100 Watt bulb. Ideal where considerable light is required. Magnetic base on both units provides firm grip on any ferrous surface, adjustable holding rods and globe arrangement permits focusing of light anywhere required.



Model 600\$6.50

Transparent, 1/8" thick plexiglass safety shield fastens on holding rod of both Model 100B or 200B in a jiffy. Provides worker protection from chips, sparks, lubricants, etc., on any machine needed.



Two Sizes:
No. 400—5"x7"—\$3.50
No. 500—8"x10"—\$4.25

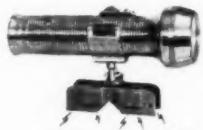
Model No. 700 is valuable tool for mechanics, plumbers, electricians, and maintenance men. Magnetic base holds firmly to any ferrous surface while ball socket arrangement permits focusing flashlight in any direction, LEAVING BOTH HANDS FREE TO WORK!

Model 350A..... \$8.50
(Less Indicator)

NOTE PRECISION ADJUSTMENT ON MODEL No. 350A, permitting the most minute adjustment of indicator by simply turning thumb screw!



Model 675.....\$8.50



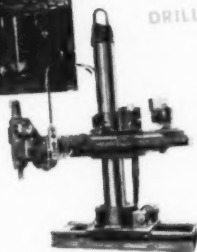
Model 700.....\$3.50

Look for attractive display chest at your mill supply or hardware dealers, featuring our entire line. He will be glad to show you these time saving tools, or write for Bulletin No. 752. If your dealer cannot supply, order direct and give us dealer's name.

CULLEN MANUFACTURING CO.

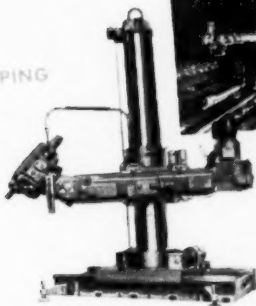
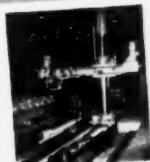
RACINE • WISCONSIN

Kaukauna UNIVERSAL AND HORIZONTAL **DRILLING AND TAPPING Machines**

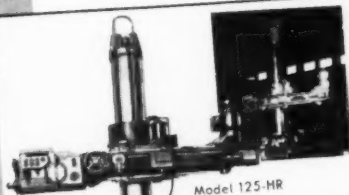


Model 125-U

UNIVERSAL
DRILLING and TAPPING
MACHINES



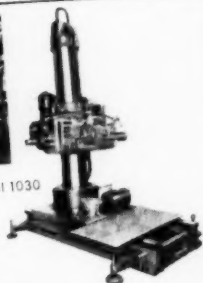
Model 140-U



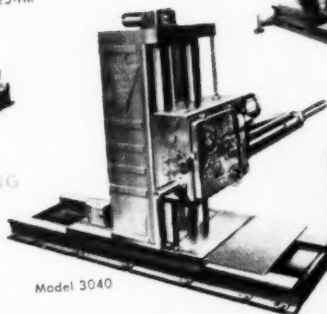
Model 125-HR



Model 1030



HORIZONTAL
DRILLING and TAPPING
MACHINES



Model 3040

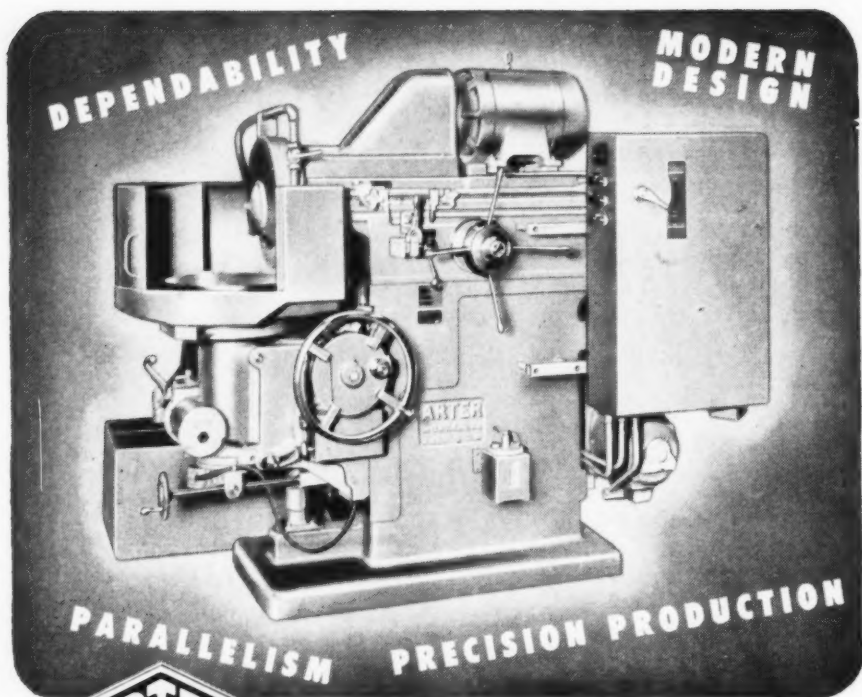


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Kaukauna MACHINE CORPORATION

KAUKAUNA, WISCONSIN, U. S. A.



Rotary **SURFACE GRINDERS**

Model D • 12" and 16"

Arter has been building Rotary Surface Grinders for more than thirty years. The Model D machines are an intermediate series, 12" and 16" in diametrical capacity. They are modern in design, dependable and built to give years of satisfactory service to all users of this type of precision grinder.

Write today for complete details and specifications.

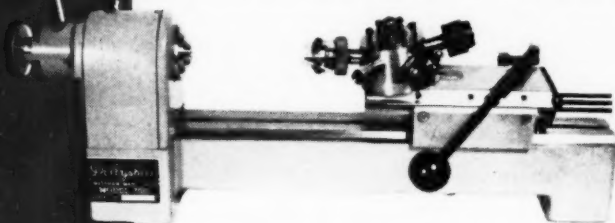
***Arter* GRINDING MACHINE CO.**
WORCESTER 5, MASSACHUSETTS

DERBY LATHE

Model 750



Lathe, 22" bed, Ball Bearing Headstock with Lever-Collet Closer, Pt. No. 3804, with Double Compound Slide Rest, Pt. No. 3652 and Six-position, self-indexing and semi-automatic Turret, Pt. No. 3610.



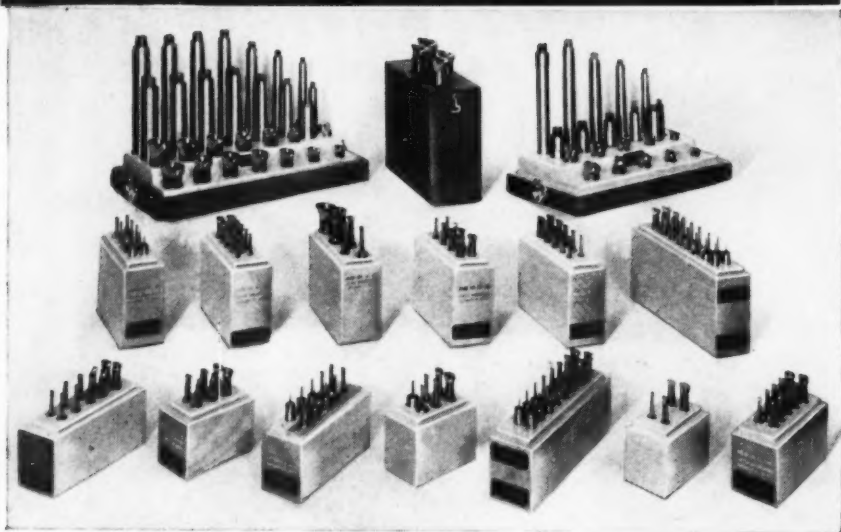
Lathe, 22" bed, Ball Bearing Headstock with Lever-Collet Closer, Pt. No. 3804, with Six-Position, self-indexing and semi-automatic Turret, Pt. No. 3160.

SPECIFICATIONS

| | |
|---|---|
| Overall Length With Lever Chuck Closer 25" | Distance between Centers.....12" |
| Length of Bed22" | Center Height2.953" (7.50 cm) |
| Height to Top of Headstock 8½" | Maximum Collet Capacity3.13" (¾")-(No. 80 metric) |
| Height to Top of Lathe Bed 4" | Maximum Spindle Speed18,000 RPM |
| Width of Bed27½" | Concentric Running of Ball Bearing Headstock |
| Width of Ways1-13/16" | Spindle0002" |
| Swing over Bed5.905" (15 cm) | Spindle Speeds with Variable Speed Drive: |
| Swing over Compound | With Pulley Ratio 1 to 1..... 600 to 5,000 RPM |
| Slide Rest2¾" | With Pulley Ratio 2 to 1..... 1200 to 10,000 RPM |

F. W. DERBYSHIRE INC.
157 HIGH ST. • WALTHAM, MASS.

***These Tool Sets . . . as important
as your jig borer itself***



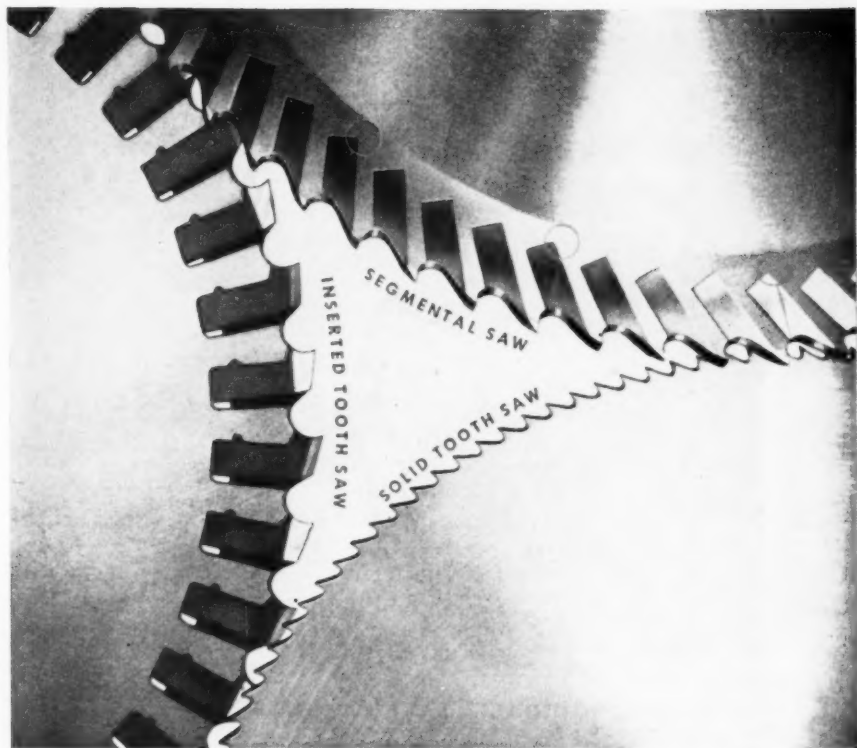
One of the handiest and most efficient things you could own. From 16 sets — each containing 4 to 16 tools — you can choose the one that embraces just the tool assortment that will best meet your particular requirements—in any required sizes from $\frac{1}{16}$ " dia. to $1\frac{1}{2}$ ", and larger. Choice of several overall lengths. In H.S. steel (Cat. Sup. 1 to 1139-6), carbide-tipped (Cat. Sup. 1 to 398-6), and solid carbide for extreme deep hole boring (Cat. 948).



BOKUM TOOL CO.

SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

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"Pick your Teeth!"

**For the best saw-performance on your job...
SIMONDS gives you a choice of All 3 Types!**

INSERTED TOOTH: For heavy production cutting of all steel, brass, copper, and aluminum. Alternating square and beveled teeth "tri-void" chips for easy cutting and clearance. Teeth can be easily replaced, singly or in complete sets, in your own plant by any average mechanic.

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SEGMENTAL: For especially smooth cuts on production work. High Speed steel toothed segments are securely held in a tough alloy plate by a special tongue and groove design, have quick clearance for faster, freer cutting.

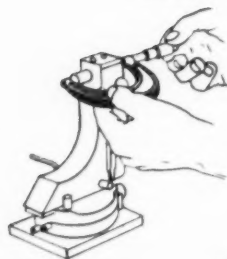
SIMONDS MAKES ALL THREE TYPES OF CIRCULAR METAL-CUTTING SAWS. So you can be sure that SIMONDS will give you *the right saw for your job . . .* for any type of machine. See your Simonds Distributor today, or write the nearest Simonds Office.



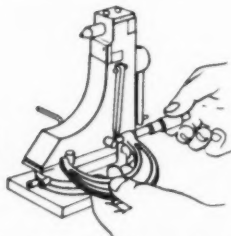
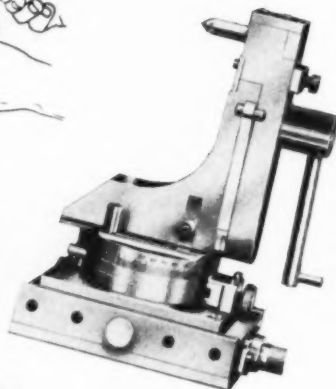
Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.,
Simonds Distributors: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada

eliminate elaborate set-ups
and operations

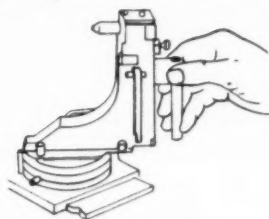
.0001" ACCURACY
Fluidmotion
WHEEL DRESSERS
dress two angles tangent to a radius
in one continuous motion
High-Carbon, High-Chrome Construction



Step 1. Obtain micrometer reading as shown, and add required convex radius or subtract required concave radius.



Step 2. Next loosen gib with wrench and "mike" over lower pins to reading obtained in Step 1.



Step 3. Tighten gib; set stops for two angles; ready for action.

ADAPTABLE TO ALL TYPES OF CYLINDRICAL AND SURFACE GRINDERS

With the "Fluidmotion" Dresser, you can dress two angles *tangent* to a radius—using one handle *in one continuous motion*. Operation is so fast and simple that beginners can use them to boost your grinding machine out-put. Forms are always clean, precise—angles and radii "flow" into each other. Contours are consistently sharp, accurate to .0001", without tool or chatter marks.

J & S TOOL CO., INC.
647 W. Mt. Pleasant Ave., Livingston, N. J.
(N. J. Highway Route No. 10)



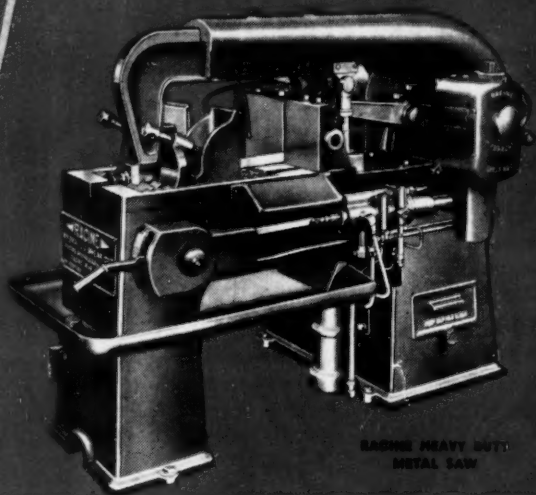
New home of J & S Tool Co., Inc.

**J & S
TOOL CO. INC.**

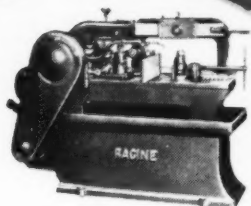
A variety of models and attachments to suit your needs. Write for free catalog covering dressers, in detail. J & S also manufactures a complete line of All-Purpose Jaw (machine) Clamps, Vises, and Special Tools. Write for Machine Shop "Time Savers" booklet.

J & S

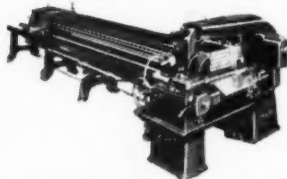
Has Time Changed Your Equipment?



RACINE HEAVY DUTY
METAL SAW



RACINE "Utility"
METAL SAW



RACINE AUTOMATIC
BAR FEED
METAL CUTTING MACHINE

Why put up with the inaccuracy and slowness of aged metal cutting equipment. Step up your production, save material, reduce cut-off time and lessen subsequent machinery operations by installing a new modern Racine *all hydraulic* Metal Cutting Saw.

Racine Saws lower costs at the first stage in every metal working job — where the bar or billet is cut to size.

Available in a wide range of models for single purpose high speed or general all-around metal cutting work, and fully automatic bar feed units in sizes 6" x 6", to 20" x 20".

Don't wait — let us send a competent field engineer now. He will review your work and recommend cost-cutting steps. No obligation. Write for complete descriptive catalog. Address RACINE HYDRAULICS & MACHINERY, INC., 2054 Albert St., Racine, Wisc.



RACINE

HYDRAULICS & MACHINERY, INC.
RACINE, WISCONSIN

NEW! position material securely —in **SECONDS!**

AMF FLOAT-LOCK SAFETY VISES extend the usefulness of your drill presses and band saws. Reduce material spoilage, prevent tool damage...*save money*. Insure fast, safe, accurate work.

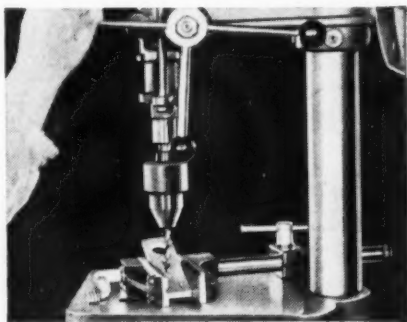
FOR YOUR DRILL PRESS, Float-Lock is a full-floating vise for *all* set-ups in tool rooms and production. Locks instantly anywhere on table... becomes a dependable drill jig. Turns over on three sides for maximum flexibility. Eliminates time-wasting clamps, straps, bolts.

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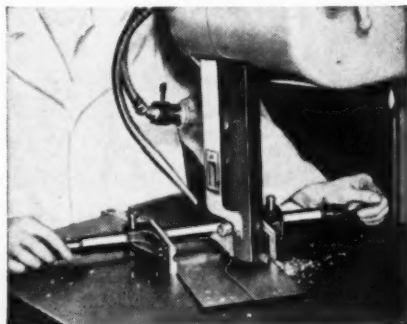
Order from **your industrial supply distributor** or write for illustrated folder to: Wahlstrom/Float-Lock Sales Dept., American Machine & Foundry Company, 511 Fifth Avenue, New York 17, N. Y.



Ideal for centering and end drilling



Perfect for angle drilling



Cutting irregular shapes made easy

SENTRY

*The Better Way
To Heat Treat High Speed Steel!*

"ALWAYS ON DUTY"

IF IT'S **P-K** IT'S O.K.
TRADE MARK

Harold Rosenberg, Works Manager at Parker-Kalon in New York, says: "We have been using our Sentry Furnaces on a multiple-shift basis for more than 15 years. Throughout that period we have relied on Sentry for all of our high speed, high carbon and high chrome tool steels. It's gratifying to know that we can depend on Sentry to help us maintain our famous P-K quality."



Request Catalog P-2

Sentry 4Y Installation at
Parker-Kalon Corporation,
New York, N.Y.



THE SENTRY COMPANY

INDUSTRIAL ELECTRIC FURNACES AND EQUIPMENT FOR HEAT TREATMENT OF METALS

April, 1953



SENTRY MODEL YP
Vertical model
for long, slender
drills, reamers
broaches, etc.



SENTRY MODEL 2Y
For small tools,
cutters of moly,
tungsten and co-
balt high speed
steels.

Sentry Busy at Parker-Kalon for Over 15 Years!



Large marine gear finishing practice moves ahead

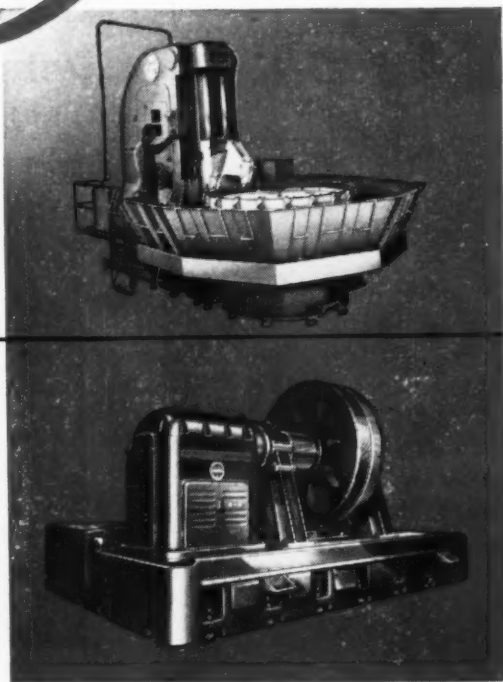
ABOUT 11 years ago the first Red Ring machine for shaving large marine propulsion gears (up to 96" PD) was completed and put into commission. Its high precision and spectacular economy promptly initiated the now accepted practice of shaving for such gears.

Since then Red Ring machines have been built to shave larger marine gears.



The United States, our fastest and largest ocean liner, launched last year, is driven by reduction gears shaved on Red Ring machines.

And now, nearing completion is a giant shaving machine to finish marine gears 15 feet in diameter to almost incredible tolerances on tooth form, pitch, lead and surface finish. With slight modifications, this unit will handle gears up to 200" PD. It will be displayed to this company's guests late in April.



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WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

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46

MACHINE and TOOL BLUE BOOK

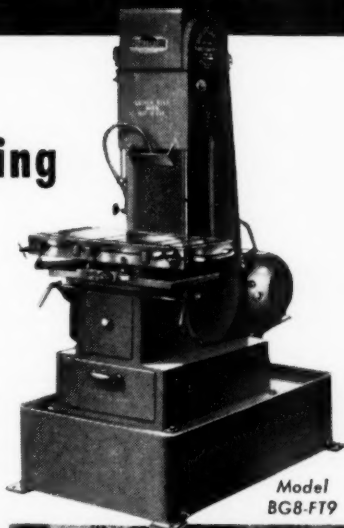
9 WAYS

to Save...

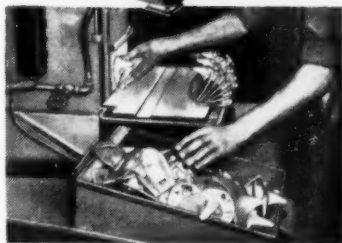
by Porter-Cable Abrasive Belt Grinding

1. **Initial Cost** is lower
2. **Installation Cost** is less
3. **Maintenance** is minimized
4. **Skilled labor** is not required
5. **Production is increased** — labor cost on each job is cut
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For example—rims of the aluminum covers shown at the right are ground in 5 seconds without a fixture, with no set up time required, and no loading time. Operator holds the pieces free-hand against the fast-moving abrasive belt. Fine, straight line finish is attained, with the surface ground to a true flat.



Model
BG8-FT9



Free! A 32-page fact-packed booklet with 46 examples of how Abrasive Belt Grinding ups output, slices costs. Mail coupon for your copy.

PORTER-CABLE Machine Co.

1264 N. Salina St., Syracuse 8, N. Y.

Name.....Title.....

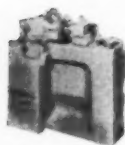
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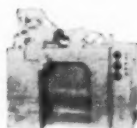
In Canada write: Strongridge, Ltd., London, Ont.

bryant internal grinding



no. 1309-W

Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6". Max. grinding length, 3 1/4".



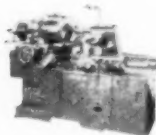
no. 1109

For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3 1/4".



no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, 3/4".



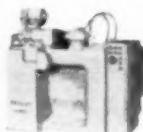
no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".



no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".



no. 1209

A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".

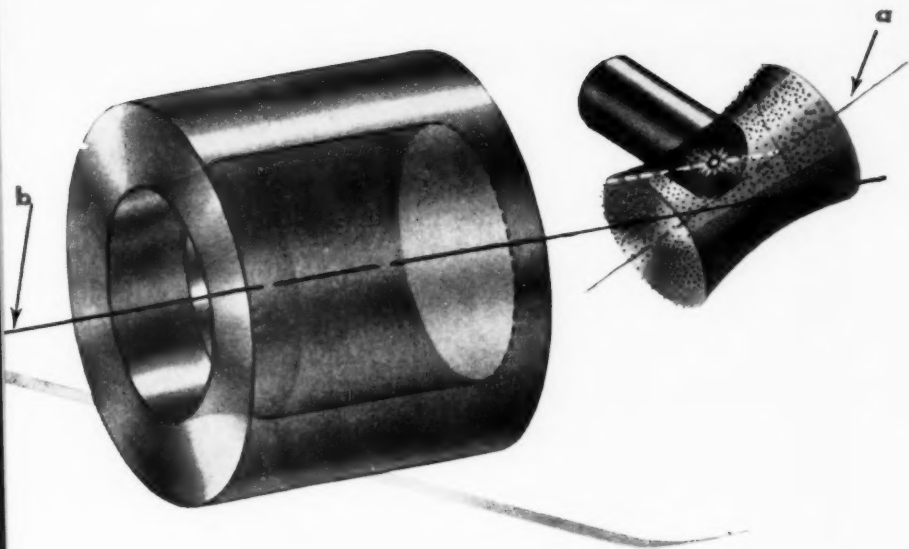


no. 1460

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".



"Alignment for Better Internal Grinding", a new, sound color moving picture is available for free showing to engineering groups. Write for descriptive booking form.



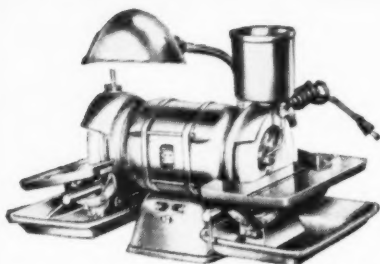
It is generally believed in internal grinding that once the grinding wheel passes the diamond, the form of the wheel will be a perfect cylinder. In our illustration the wheel is tipped as it passes the diamond and an hourglass form is generated on the wheel. This condition is not peculiar to an internal grinder. The same form is generated in turning an O.D. on a lathe if the tailstock is either high or low.

The path of the diamond is a straight line across the surface of the wheel, but the wheel will not contact the work on the same straight line. Contact may be at a point on each end of the wheel. Since the wheel does not contact across its full face, wheel wear will be excessive and the wheel will act soft.

The geometry of the hole may be upset as in the illustration, with the result that the back of the hole will be tight. Neither turning the workhead nor changing the length of traverse will correct this error. Because the wheel is contacting at either one or two points, instead of a straight line, the surface finish will be poor. The remedy is to correct the alignment by bringing the wheel center line "a" parallel with the path of the wheel and in plane with the work center line "b".

Bryant Chucking Grinder Company Springfield, Vermont, U. S. A.

Internal grinders • Internal & External thread gages



Ask for
Bulletin 341B

CARBIDE TOOL GRINDER

The $\frac{1}{2}$ hp motor that powers this Baldor Grinder is trouble free—has no commutator, centrifugal switch, or brushes. Electronically balanced within $\frac{1}{50}$ ounce of perfection, the armature rotates at 3400 RPM without vibration—an Engineering achievement that makes true precision work possible.

\$143.20



Ask for
Bulletin 353

NEW WIDE CLEARANCE GRINDER \$86.00

This streamlined grinder, 8200 series, is excellent for grinding long and odd shaped pieces because of ample clearance between wheels and motor frame. $\frac{1}{2}$ hp, 8" wheels, 3450 RPM, capacitor-start, capacitor-run motor GUARANTEED 2 yrs. against burnout. Baldor makes complete line of 6"-12" general purpose bench and pedestal grinders.

Baldor

Baldor Electric Co.
4353 Duncan Ave.
St. Louis 10, Mo.

BETTER GRINDERS

BULLARD SPACER

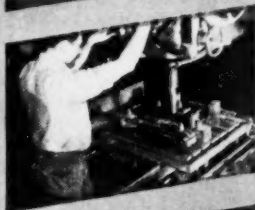
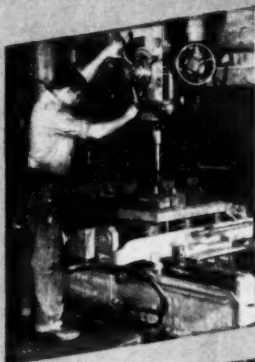
We can offer Favorable Deliveries on Bullard Spacers.

Norton Company, Grinding Machine Division

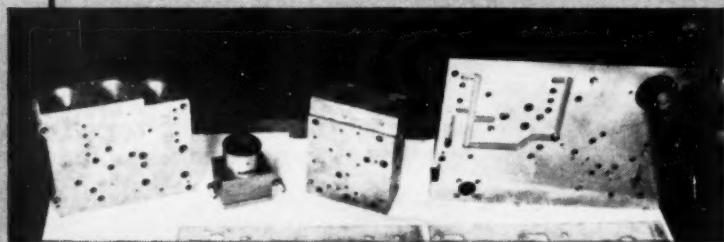
is obtaining important advantages from use of 4 BULLARD SPACERS on intricate drilling, reaming and tapping jobs.

Among the benefits received is a marked reduction in Operator fatigue. This is especially pronounced in overtime operation.

NORTON COMPANY has also found that with incentive time allowances, jig work Operators' efficiency is regularly held at 90% to 125%, while that of their Operators on BULLARD SPACERS runs 115% to 150%.



Ask for your copy of "The Norton Story"



THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT



Grit Magnified 250 Times

An ANT could carry away this cutting tool

**WHICH LED TO NEW CONCEPT THAT CREATED
CINCINNATI GRINDING WHEELS**

■ The tiny grinding grits shown with the ant is the core of an entirely new approach in grinding wheels. For Cincinnati Milling has proved, beyond doubt, that the grinding process is a true metal cutting process. The grinding grits do not abrade or wear away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting processes.

BASIC CHIP TYPES:

Photomicrographs of cross sections taken thru partially formed chips obtained under various conditions in machining operations such as turning, milling, planing and broaching.



Type 1—discontinuous or segmental chip.



Type 2—continuous chip without built-up edge.



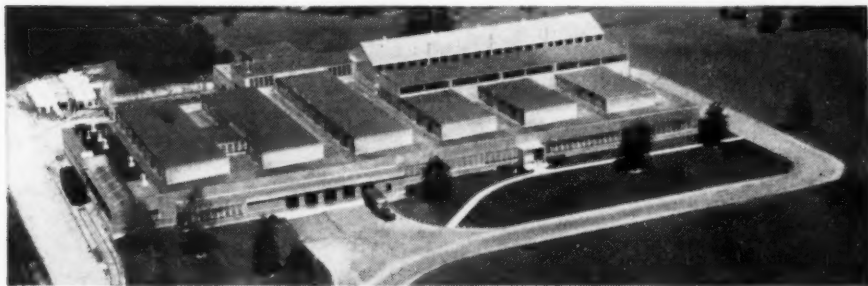
Type 3—continuous chip with built-up edge.

This new concept is not based on hasty conclusions. It represents 25 years of research by The Cincinnati Milling Machine Co. in chip formations, coupled with practical experience in applying the basic fundamentals of grinding to a wide variety of work on both centerless and center-type machines.

For you, this means grinding wheels developed and tested over a period of several


years on the basis of true function—as true cutting tools forming true chips.

Available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, write, wire or phone Cincinnati Milling Products Division, The Cincinnati Milling Machine Co.



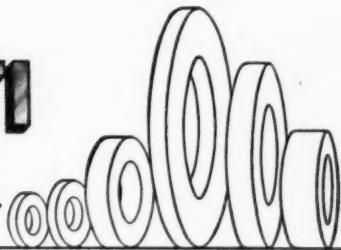
Cincinnati Grinding Wheels are manufactured in this new, completely modern plant.

FREE BOOKLET. Now available to industry is a new booklet entitled "A New Concept In Grinding Wheels." It contains valuable information for everyone interested in grinding operations. A copy is yours for the asking. Just write Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.


CINCINNATI
Grinding Wheels

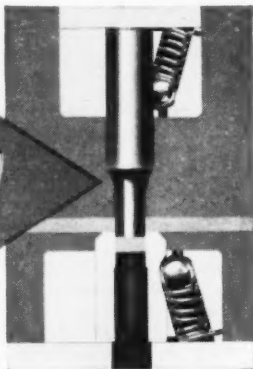
THE CINCINNATI MILLING MACHINE CO.

Cincinnati 9, Ohio



a Punch for Every Purpose

- ... THIN METAL
- ... THICK METAL
- ... SPECIAL ALLOYS
- ... STANDARD SHAPES
- ... UNUSUAL SHAPES
- ... SMALL HOLES
- ... LARGE HOLES



What are your piercing or forming requirements — unusual shapes — large holes — special alloys — thick metals — etc.? There is either an R-B punch in standard shapes and sizes to meet your needs or R-B will manufacture special punches, die buttons and retainers to your specifications.

Regardless of punch type (special or standard) manufactured by R-B for your piercing operation you will find the same standardized R-B features inherent in the design to save you time and money. These include such features as snap-

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Many hole-making applications, that formerly required drilling or some other costly means, now can be done with R-B interchangeable punches. If you have thought your piercing jobs too tough for interchangeable punches, it will pay you to investigate the wide application potential of R-B standardized equipment—R-B engineering service is available for your tough piercing problems.

TOOL STANDARDIZATION IS THE BASIS FOR SAVING PRODUCTION TIME. WITH R-B YOU GET THE ACCEPTED STANDARD OF THE SHEET METAL INDUSTRY—IN STANDARD DESIGN FEATURES THAT SAVE IN ENGINEERING, DIE CONSTRUCTION AND OPERATION.



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Also Produced in Allied's Four Plants . . . HARDENED AND PRECISION GROUND PARTS • STANDARD CAP SCREWS • SPECIAL COLD FORGED PARTS • SHEET METAL DIES • ALLITE DIES CAST OF ZINC ALLOY • JIGS • FIXTURES

Prominent in the Jet Engine Program

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"PACKAGED PRECISION"

NEEDS NO WIRES,
HOSE, ELECTRONIC
GEAR OR
HEAVY BASE

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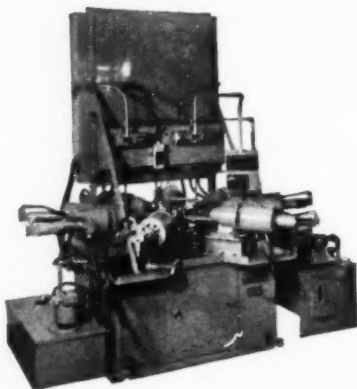
FOR GAGING HIGH-PRECISION HOLES

REQUEST NEW BULLETIN NO. 46

COMTOR CO. 62 FARWELL ST., WALTHAM 54, MASS.

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| Edith Bartler, 1001 Sunset Blvd., St. Louis 5, Missouri | James A. Davis, 1001 Sunset Blvd., St. Louis 5, Missouri | W. C. Lutz, 1001 Sunset Blvd., St. Louis 5, Missouri | W. R. Lutz, 1001 Sunset Blvd., St. Louis 5, Missouri | W. R. Lutz, 1001 Sunset Blvd., St. Louis 5, Missouri |
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Engineering Sales Company, 112 Portland St., Newton 12, Mass. Tel. — 1945 South Main Street, Boston 12, Mass.



New Machine Drills 3840 Holes Per Hour

EXCEPTIONALLY fast drilling of 32 holes (3/16" diam.) in a steel part is made possible by this new machine which incorporates 8 Model HH Govro-Nelson Automatic Drilling Units, electrically interlocked with automatic, hydraulically operated clamping and indexing.

In operation, the operator places the part on a fixture and presses the start-cycle switch. The part is automatically clamped and 8 holes are drilled simultaneously at each of the four indexes, thus completing the 32 holes. Then the part is automatically unclamped. Output rate: Approximately 120 parts (3840 holes) per hour.

If you have similar operations and would like to speed up your production rate, send samples and part prints and we shall be pleased to recommend the proper Automatic Units or quote on a complete set-up. Literature sent upon request.

WRITE FOR
Literature

GOVRO-NELSON CO.

Machinists of Precision Parts for 30 Years

1933 Antoinette

Detroit 8, Mich.

Automatic

DRILLING UNIT



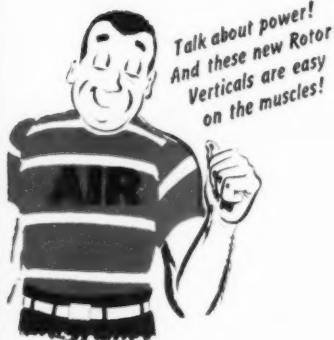
*New Rotor
B-35 Vertical
Grinder with 6"
cup wheel smooths
a casting.*



*New Rotor
B-35 Vertical
Sander with 9"
pad blends welds
of machine base.*

Speed up the job with these

NEW ROTOR VERTICALS



YOU should try these new Rotor "power houses"! See how fast they remove metal. See how easy they are to handle...light in weight (only 10 1/4 lbs.) because of magnesium castings... comfortable balance because of adjustable handle angle.

Ask for a demonstration! Write for free copy of Catalogue No. 40.

Air O'Tool and Hi-Cycle O'Tool

AIR

THE ROTOR TOOL CO.

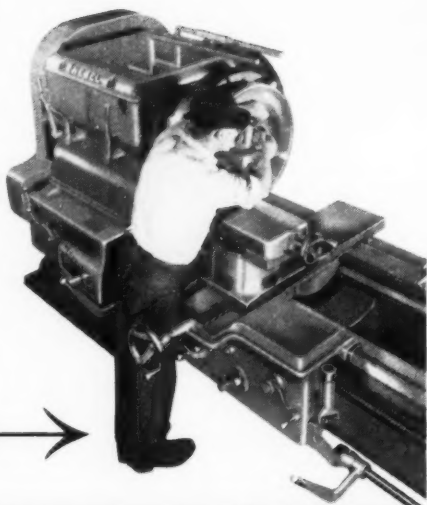
CLEVELAND, OHIO

**HIGH
CYCLE**

UNBIASED ANALYSIS OF PORTABLE TOOL COMPANIES

*Nebel's
a natural!*

FOR MAINTENANCE →



FOR PRODUCTION



KAISER-FRAZER CORP. uses 8 Nebel L.N. lathes for fast, accurate, economical machining in production lots.

NEBEL ENGINE LATHES are demons for economy. On production or maintenance, you get power, stamina and accuracy at minimum cost.

NEBEL GAP LATHES, removable block gap and extension bed gap, offer larger swing and center distance capacity . . . combine low price with high quality. Get full information today! The Nebel Machine Tool Co., Cincinnati 25, Ohio. Members of the National Machine Tool Builders' Association.

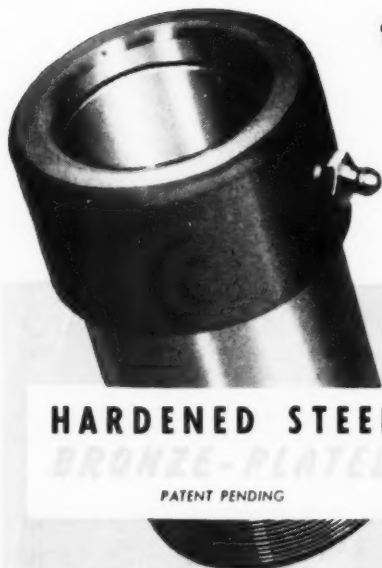
Nebel
the workhorse of the
metalworking shop since 1899



Now a long-wearing **GUIDE-PIN BUSHING**

that

*WON'T SEIZE
OR SCORE*



HARDENED STEEL

BRONZE-PLATED

PATENT PENDING

Lamina Guide-Pin Bushings combine the long wearing of hardened steel with the free, smooth glide of bronze. No more seizing or scoring from hardened steel running on hardened steel . . . no more out-of-round wear characteristic of soft non-ferrous bushings . . . Lamina Bushings provide the answer to long, seize-free bushing service in punch and die shoes.

Lamina Guide Bushings are made of hardened steel with .001" to .002" of bronze electro-plated on the inside diameter. In addition to this, an oil groove, $\frac{3}{16}$ " wide is machined into the

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In actual use on hundreds of Lamina-built dies, in laboratory tests under conditions far more severe than shop conditions, these bushings without exception have proven absolutely trouble-free in service.

Stocked in a variety of sizes and lengths for straight pins, shoulder pins or removable pins. Specials made to order. Lamina Dies & Tools, Inc., 14925 W. Eleven Mile Road, Berkley, Michigan.

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Send for Lamina bulletin which gives full details and dimensions on Lamina Guide Bushings. Also contains information on a variety of other Lamina tools, dies and job proven die making equipment.



Lamina
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LOOK in this BOOKLET

when you're *puzzled about Tool Materials!*

A-L OFFERS YOU Complete Service for Modern Tooling

By "complete" is meant that Allegheny Ludlum produces the full range of modern cutting tool materials, hence is in position to know and recommend the type best suited for any stated purpose. Unbiased content makes the 8½" x 11" booklet, shown, all the more valuable. Specify its title, "Cutting Tool Materials."

ADDRESS DEPT. MB-40

You should have a personal copy of this 36-page booklet close at hand, if you are continually running into new cutting problems. Use it as a guide to quick answers to scores of possible questions such as:

"Should we use *Carbide* on this job? What grade?" . . . or, "How about tooling up with *Cast Alloy* for that other run?" . . . or, "Can we cut this extra-tough stock fast enough with our usual grade of *High Speed Steel*?"

This booklet in no way replaces, but does supplement, what you can learn by practical experience or what you can gain by calling in an A-L tool engineer. In compact form and quite impartially, the booklet presents the basic facts that enable you to speedily compare the suitability of various tool materials for specific uses. *Send today for your free copy.* There is no obligation involved.

• *Allegheny Ludlum Steel Corporation,*
Henry W. Oliver Bldg., Pittsburgh 22, Pa.



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Allegheny Ludlum

W&O 3703

R AND L TURNING TOOL

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POSSESSION

14
TOOLS IN
1



Machinists treasure quality tools!

Besides changing from right to left in ten seconds, the R and L Turning Tool replaces an assortment of fourteen separate tools. It can be used for rough as well as finished cuts, meeting the most difficult job requirements.

the tools a particular machinist would design for himself . . .

RIGHT

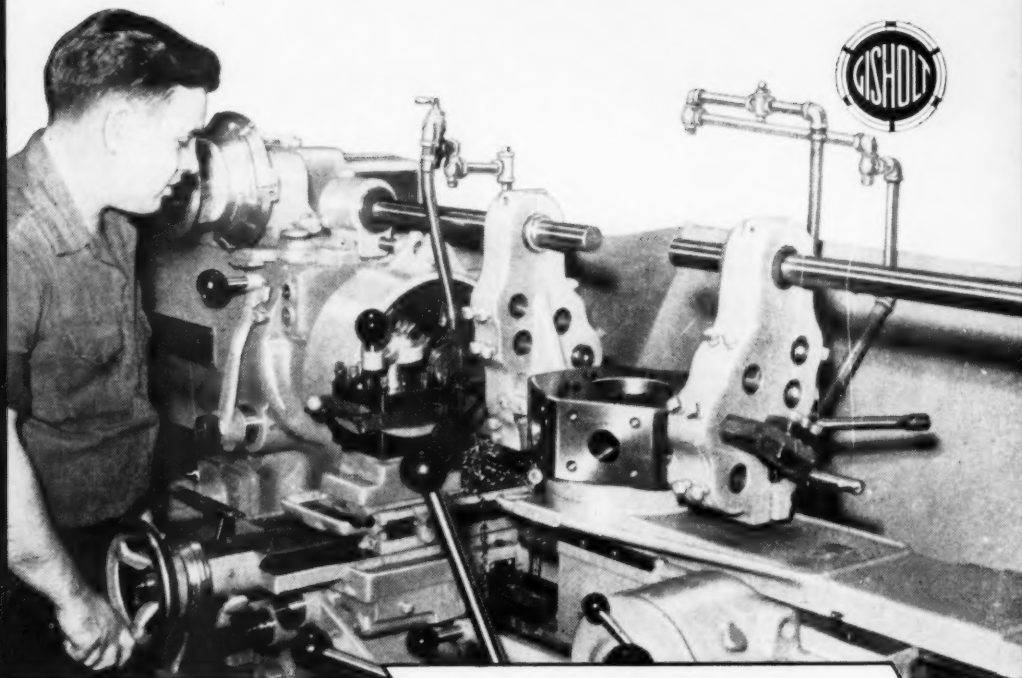
R and L

LEFT

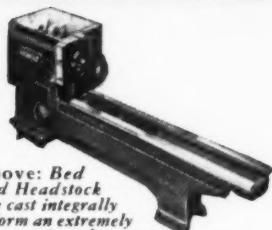
TOOLS

1825 BRISTOL STREET • PHILADELPHIA 40, PA.

TURNING TOOL • TAP AND DIE HOLDER • UNIVERSAL TOOL POST • TURRET BACKREST HOLDER • CUT-OFF BLADE HOLDER • RECESSING TOOL
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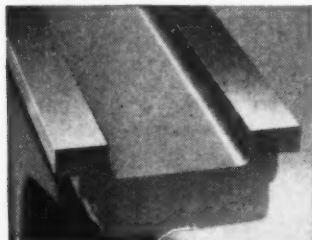


ACCURACY that doesn't "wear off"



Above: Bed and Headstock are cast integrally to form an extremely heavy unit and to provide the rigid foundation for all types of work.

Below: Block type ways are straddle keyed to the bed and ground in perfect alignment with the spindle. All working surfaces are hardened to 64-66 Rockwell "C".



Here are two good reasons why you can count on the accuracy of Gisholt Turret Lathes—now and years from now.

One-piece bed and headstock, cast as a heavy, rigid unit, reduce distortion and vibration to a minimum. Headstock is jig-bored to insure—and maintain—perfect alignment of spindle and drive shafts, with ample metal to provide the most solid support possible.

Hardened steel ways are augmented by hardened steel strips secured to the ram saddle, as well as hardened steel gibs and clamps, making an assembly that is virtually wear-proof. Its accuracy is further preserved by force lubrication.

These advantages are yours for the long life of any Gisholt Turret Lathe. Ask for complete details.

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



GISHOLT

MACHINE COMPANY

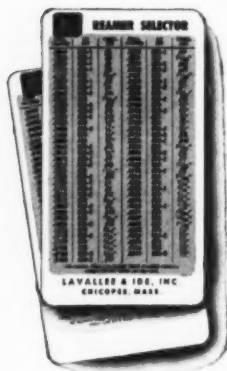
Madison 10, Wisconsin

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This sturdy pocket size Reamer Selector is a must for buyers and users of reamers. It lists 143 hole sizes from .0400 thru .5010 which can be reamed with STANDARD L&I Reamers. Includes catalog numbers and equivalent sizes for easy ordering.

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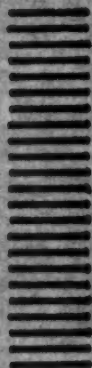
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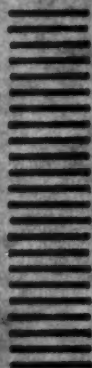
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APRIL, 1953

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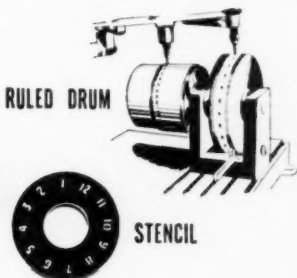
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THEY CAN TAKE IT ...and DO!
...and still maintain accuracy



STANDARD

Dial Indicators

Built to stand the knocks—often unavoidable

NEW - with Years of Service Ahead



**REGULAR
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**AGD
SPECIFICATIONS
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Made in 22 models including 4 dial diameters, 7 different graduations. Also 90° models (stem perpendicular to back). Long Range and Long Stem types.



*Decimatic
SERIES*

**AGD
SPECIFICATIONS
except Range
and Marking**

For especially fine checking, extra high repeatability and accuracy. Marked in decimals. No whip of hand. 16 models.

This One Was New...
Years Ago -
Still Serviceable

Obviously it has withstood hard usage, yet indicators such as these are constantly being reconditioned (at a fraction of the original cost) — to return still more dependable service to the owner.

You wouldn't treat your watch the way some indicators have to be treated. Standard Dial Indicators are built to give continuing accuracy while standing the knocks.



**Outstanding Reason for the
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Standard Indicators is the**

**SHOCKPROOF
MECHANISM**

Proved by experience to prolong instrument life greatly, Standard's Shockproof Mechanism protects internal parts right from the spindle on. Furnished regularly in most models, not treated as an optional extra. Standard Indicators give longer, trouble-free life, need fewer repairs, are dependable. These facts add up to "Greater Economy."

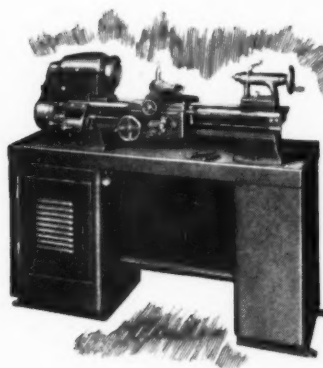


STANDARD GAGE CO., INC., Poughkeepsie, N.Y.



"Those trainers say the champ can take it like a

Logan LATHE!"




Logan No. 933
QUICK CHANGE GEAR LATHE
11" Swing, 1" Collet
Capacity 1 3/4" Spindle Hole

WORKHORSE schedules are the lot of Logan Lathes because industry knows it pays to keep the Logans turning. Durable as well as accurate, the Logan *stays* profitable to operate. Sustained accuracy is built into its ball bearing spindle and into the rugged, balanced, warp-free bed with two V-ways and two flat ways precision ground to a tolerance of .0005". The entire lathe is ruggedly proportioned. Self lubricating bronze bearings protect vital points against wear. Construction like this makes your Logan Lathe with its 11" swing and 1" collet capacity a tool that can "take it" through extra years. That is the big reason why no other lathe of comparable specifications can match Logan economy. Write for *The Logan Catalog*.

LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

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KENNAMATIC
STYLE SBL-A

Sure Cure for a **CUTTING** **HEADACHE**



If you have a cutting headache, caused by tool failure, take this three-way cure:

- (1) Use Kennametal cemented carbide . . .
- (2) in tooling designed by our engineers who know carbides from the ground floor up . . .
- (3) applied with the help of our field engineers whose aggregate experience is greater than that of any other carbide tool manufacturer.

This cure is working in thousands of shops—handling jobs which no other tools can do. But, even if you don't have a cutting headache, consider this important point:

Tooling that takes tough jobs in stride is the kind to use, also, on routine jobs where floor-to-floor time and overall cost-per-piece must be determined with accuracy, and maintained.

That tooling is Kennametal. Let us prove it in your shop. Kennametal Inc., Latrobe, Pa.

KENNAMETAL

CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY



How machining time was cut in half on vital jet engine part

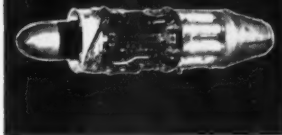
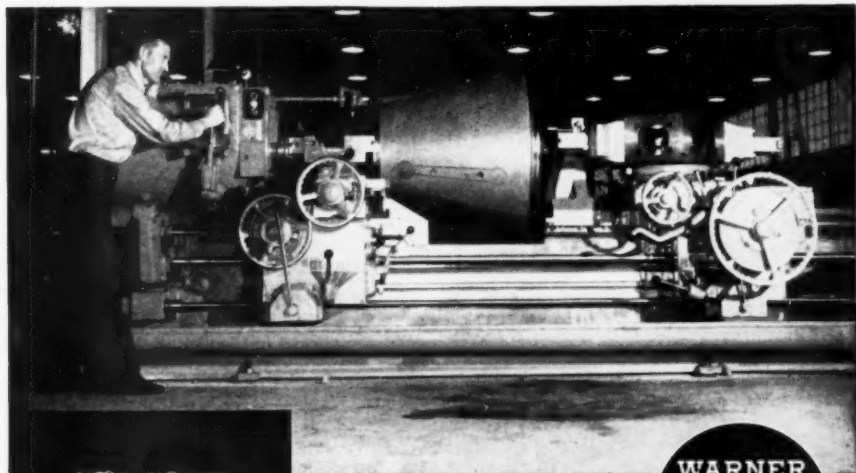
FROM Ryan Aeronautical Company comes this report. They recently installed the first of six modified Warner & Swasey 4-A Heavy Duty Turret Lathes to handle one important phase of production on jet engine components. In addition to slashing machining time in half, this new machine eliminated one complete setup, did away with storage problems, and drastically reduced handling.

This Warner & Swasey was especially designed with special tools and tool holders to machine the flanges on each end of the jet engine's big heavy-gauge, stainless steel exhaust cone. Prior to its installation, Ryan had to set up and machine the flanges on one end of each of a dozen cones, then store the cones

around a machine until the new tooling setup was completed and the other ends of the cones machined.

Now, with the Warner & Swasey, the flanges on both ends are machined simultaneously. Cutting tools turn and form the flanges in one pass to 50 micro-inch smoothness. Only one setup is required for each cone, and as its flanges are machined, it is sent on down the production line. Scarce floor space is saved, and handling minimized.

Here is another example of how a Warner & Swasey Field Engineer, working with a company's production men, helped apply Warner & Swasey experience and "know how" to solve a tough production problem.



Warner & Swasey 4-A Heavy Duty Turret Lathe simultaneously machining flanges on each end of exhaust cone for jet engine.

General Electric J-47-23 jet engine, parts of which Ryan makes in large volume, powers some of our fastest aircraft.

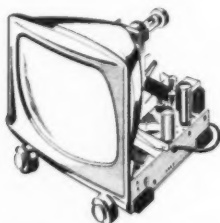
**WARNER
&
SWASEY**
Cleveland
PRECISION
MACHINERY
SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

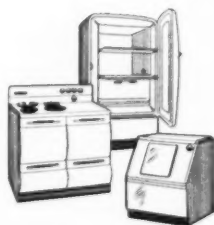


UNBRAKO SELF-LOCKING SOCKET SET SCREWS feature the following advantages: knurled cup point that won't work loose; accurate hex socket for nonslip,

positive drive; fully formed threads—Class 3 fit; heat treated alloy steel for strength; standard sizes—#4 to 1"—in a full range of lengths.



USE UNBRAKO's wherever ordinary cup point set screws are used. On radios, television sets and electronic equipment.



On refrigerators, washing machines, and other household appliances.

Our Fifth Year : A START FOR THE FUTURE

9 times out of 10 a standard UNBRAKO will do the job

A special socket screw may not be necessary, a standard UNBRAKO usually does the same job — much cheaper. Your local industrial distributor stocks Standards. He gives immediate attention to your requirements, and such extras as special delivery to your plant. Write for UNBRAKO Standards. SPS, Jenkintown 52, Pa.

UNBRAKO

SOCKET SCREW DIVISION

SPS

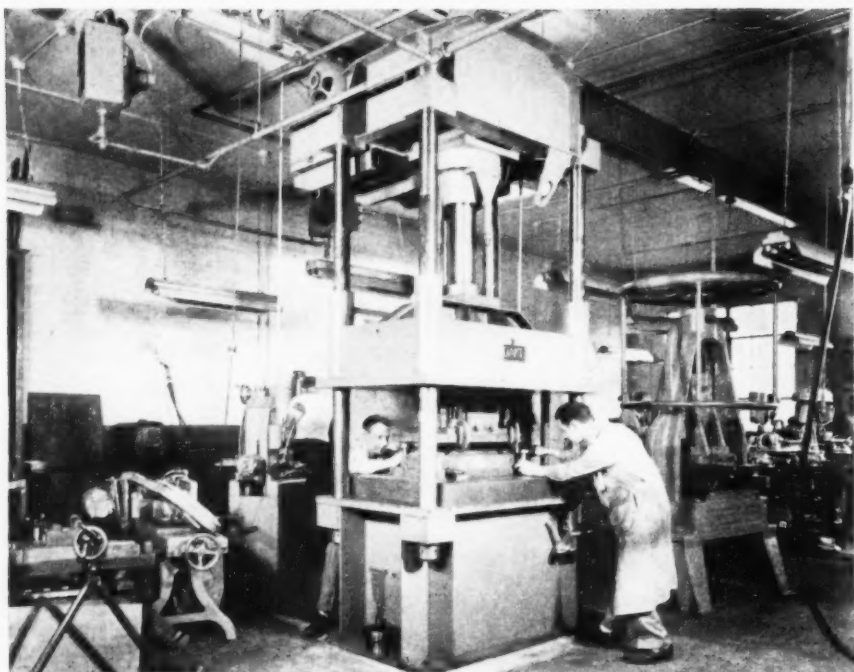
JENKINTOWN PENNSYLVANIA



On power mowers, power saws and other power tools.



UNBRAKO Standards—as listed in the SPS Catalog—are stocked by leading industrial distributors everywhere.



The diemaker who made a nuisance of himself

This is the story of Three Star Manufacturing Co.—a custom diemaker who serves a number of manufacturing plants in Chicago.

As in most such shops, his only means of trying out dies was a hand power screw press which sometimes needed six or seven men to get the needed pressure.

Large dies had to be tried out on his customers' production presses . . . which required drayage (\$15 to \$20 each way) and interruption of his customers' production. It meant both expense and nuisance to his customers and himself every

time a die had to be tested.

Now he has ended the nuisance by installing the press shown above in his own shop. It not only saves time and money, but avoids the embarrassment of having workers in his customers' plants see and know that occasionally a die must be taken back for adjustment.

Specifications for single-acting and double-acting die tryout presses in ten air-operated and sixteen electrically operated models are contained in Bulletin 267—sent gladly on request.

Dake Engine Company, 608 Seventh St., Grand Haven, Mich.

**DAKE
PRESSES**



Air-Operated Presses



Hand Operated Hydraulic



Power Operated Hydraulic



Guided Presses



Gas Type Presses



Movable Frame

BAY STATE MOUNTED POINTS and WHEELS



Best because:

You get . . .

**UNIFORM, SAFE,
PRECISE PRODUCTION**

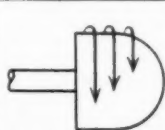
1. UNIFORM



2. SAFE



3. ACCURATE



4. DURABLE



1. Made from solid blocks of perfectly sized materials.
Result: Complete elimination of "hard and soft" spots.

3. Each wheel trued and shaped after mounting on its spindle.
Result: Perfectly concentric; ready to use when you get it.

2. Deep-knurled, high strength alloy steel spindles, and special adhesive.
Result: Abrasive heads stay on spindles.

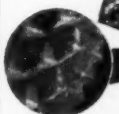
4. Completely uniform structure; pre-tested, positive bonding.
Result: Longer useful life; use them right down to the spindle.

INDICATOR
ACCURACY



Precision Shaped

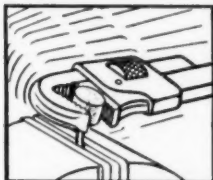
on the spindle for perfect contour and complete concentricity.



Deep-Knurled
for EXTRA SAFETY, in high-strength alloy steel spindles. THE HEADS STAY ON!

Specially Cemented

USE THEM . . .
right down to the spindle!



Wrench-and-vise test proves its strength. This cement HOLDS, under EXTREME STRAIN.

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To Protect Their Ships From Unseen Dangers . . .



Mariners Use Marking Devices

Guiding his ship through shoal, narrow or treacherous waters, the Mariner depends on channel buoys, lighthouses, flashing lights, and other marking devices—all directing him to his safe course through navigable water.

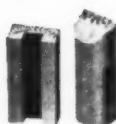
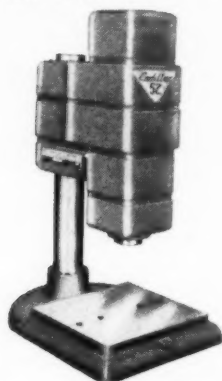
CADILLAC 52

**Air Impact Press
For
High Speed Marking—**

**Assembling, Branding,
Staking, Crimping, Riv-
eting and also for pro-
ducing Light Stampings**

This new Cadillac "52" is faster, has more power, more pressure. It delivers in speeds up to 10,000 strokes per hour — pressure can be obtained up to 8 tons, and is adjustable from light to heavy marking. The pressure can also be regulated to give proper ram action for branding or color leaf marking. Special jigs or fixtures are not required for average work. The Cadillac "52" has automatic controls which "think" for the operator — give high production. Can be supplied as: Hand actuated, foot actuated, electrically actuated. It is light in weight, can be easily moved.

For full information write for Bulletin A-52



DIE INSERTS



ROLL
SEGMENT DIES

FORGING HAND STAMPS

Many marking problems can be solved by Cadillac Marking Devices such as these . . . all made of special alloy tool steel, giving long life and unexcelled performance.



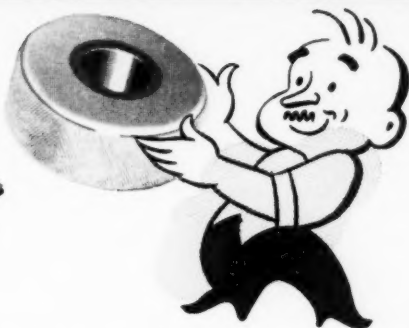
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write for Bulletin SE-130

CADILLAC STAMP CO.

FACTORY and OFFICES
17321 RYAN ROAD • DETROIT 12, MICH.

Savings reported by users of **LINCOLN PARK** **CARBIDE GAGES**

CARBIDE
slices initial
gage costs over
\$6,500.00
ANNUALLY



An eastern manufacturer of ground glass products found replacement costs of worn steel gages to be excessive—gages were expended at a rate of 2,500 per year. At \$3.50 per gage his annual cost for steel gages was \$8,750.00. Carbide gages were applied to this inspection operation and lasted at least 25 times longer than previous steel gages. After making a complete switch to carbide only 100 gages at \$22.00 each were purchased per year. Thus, carbide gages cost only \$2,200.00 annually and this manufacturer saved \$6,550.00 each and every year on gage replacement costs alone.

MANUFACTURERS OF:

CARBIDE, CHROME PLATED AND STEEL GAGES — CARBIDE ROTARY FILES—ALSO, FACILITIES AND SKILLED PERSONNEL AVAILABLE FOR PRECISION PARTS PRODUCTION

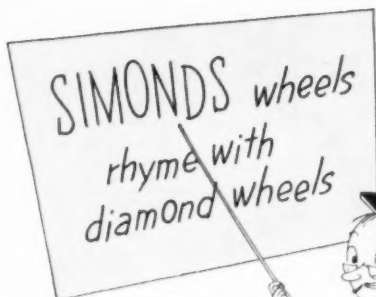
THE PLUS IN PRECISION



Lincoln Park

INDUSTRIES, INC.

1719 FERRIS AVENUE, LINCOLN PARK 25, MICH.

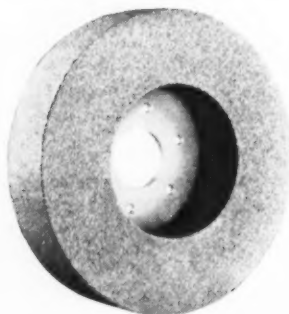


but ... for carbide
tool grinding

SIMONDS WHEELS
cost much *less*



SIMONDS
ABRASIVE CO.
Grinding Wheels



Sharpen *your* carbide tools the economical way. Avoid damaging sensitive edges. Prevent shape distortion. Use Simonds' G Electroton (silicon carbide) grinding wheel. It's the popular "green" wheel . . . less expensive than diamond wheels . . . but a "gem" for safe, cool grinding that prolongs tool usefulness.

Especially efficient for roughing and semi-finishing, these wheels are also frequently used for finishing, too. Made to high standards of accuracy, as are all Simonds Abrasive Company products . . . including grinding wheels, mounted wheels and points, segments and abrasive grain.

Write for your copy of our bulletin (ESA 181) about G Electroton wheels, including type PM (plate mounted) and tool and cutter shapes—*All* available from stock. Your Simonds Abrasive distributor is equipped to serve you locally. We'll gladly send you his name too.

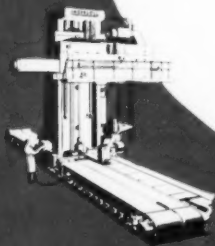
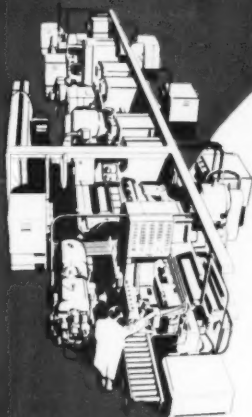
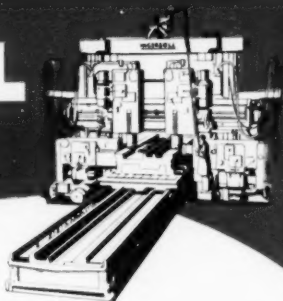
SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

INGERSOLL

CUTTER GRINDER

The Key to Maximum Production



An Ingersoll Cutter Grinder may cost only 1/100th as much as the production equipment it services, but its importance is far out of proportion to its price. Adequate facilities for grinding cutters accurately and quickly are essential to get maximum returns from large investments in costly production machinery.

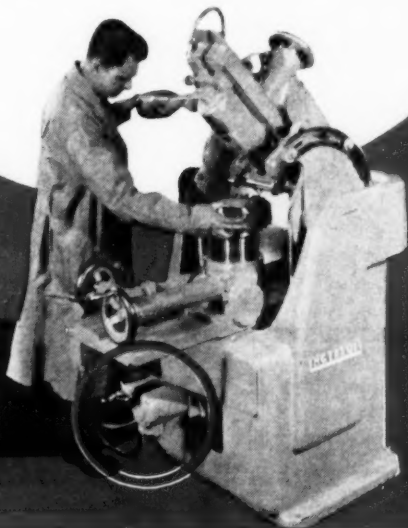
You are undoubtedly sacrificing production

- (1) if you do not have enough Ingersoll grinders, or
- (2) if your present Ingersoll grinders are in need of replacement.

The Ingersoll Cutter Grinder . . .

Grinds inserted blade cutters *more accurately* because the cutter is located on the grinder in the same manner as on the milling machine spindle.

Grinds cutters *faster* because the face, periphery, and corners are ground in a single setting of the cutter.



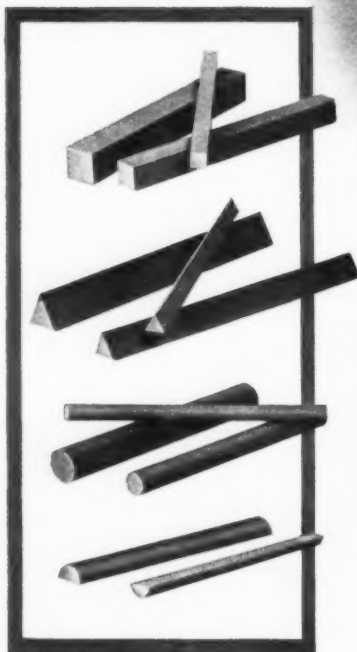
Write for Ingersoll Cutter Grinding Manual 48K.

The Ingersoll Spin-Grinding Attachment, available on new grinders, cylinder-grinds blades to uniform height on face and periphery. It reduces the time for sharpening a 10-inch heavy duty Shear Clear Face Mill with new T.C. blades from 2-1/2 hours to 2 hours.

THE INGERSOLL MILLING MACHINE CO.
ROCKFORD, ILLINOIS

**THAT EXTRA
TOUCH BUILDS...**

*higher quality
in your work*



**INDIA® and HARD ARKANSAS®
OILSTONE FILES**

For real precision work-fitting dies and machine parts, deburring, radiusing, chamfering and touching up cutting-tool edges — there is nothing to equal hand stoning. INDIA and HARD ARKANSAS files, shaped to conform to the work surfaces, enable you to do a quick stoning job to meet close tolerances. INDIA files, of tough, hard electric-furnace abrasive, are favored for general "quick touch-up" work, while HARD ARKANSAS, a fine textured natural stone, gives you the ultimate in "superfine" edges and finishes.

For Export: Norton Behr-Manning Overseas Inc.,
New Rochelle, N. Y., U. S. A.

In Canada: Behr-Manning (Canada) Ltd., Brantford.

Catalog 19 gives complete data on the more than 200 sizes, shapes and grits available. Write Behr-Manning, Troy, N. Y., Dept. BB-4

®*Trade-Marks



BEHR-MANNING
CORPORATION

division of NORTON Company

▲ COATED ABRASIVES ▲ SHARPENING STONES ▲ PRESSURE-SENSITIVE TAPES





TIGHTEN YOUR GRIP ON PRODUCTION

Production flows faster and smoother when your machine tools are equipped with Jacobs Chucks.

Rugged construction, great gripping power and accuracy have made The Jacobs Plain Bearing Drill Chuck the choice of machinists throughout the world.

The Jacobs Manufacturing Company, West Hartford 10, Connecticut.

IF IT'S A **JACOBS** IT HOLDS

**Jacobs and your
local distributor**

are ready to deliver the chucks you
need and the service you deserve.

... *first in chucks*
... *first in service*

This is an APEX tool.....

A socket—measuring 11" in diameter, 8 7/8" in overall height, to drive 7 1/2" hex nuts.

An extension—measuring 3 1/2" in diameter, 30" in overall length, with 2 1/2" male and female square drive.

This special Apex socket and extension is to be driven by a new power tool designed to develop 3,000 to 6,000 ft./lbs. of torque.

We're quite sure you can't use this particular Apex tool in your plant, but it's an interesting example of our ability to furnish an effective answer to just about any nutsetting problem.

AND THESE ARE APEX TOOLS . . .

Most likely, the answer to your nutsetting problems will be found among the more than 5,000 stock types and sizes of Apex nutsetting tools. If not, just send us a sketch or blueprint and we'll do our best to furnish a special answer . . . we'll quote promptly, without obligation.

CATALOG 29

122 pages of helpful information on Apex sockets, extensions, adapters, straight wrenches and universal sockets and wrenches. Write, on your company letterhead please, for your copy.

APEX TOOLS

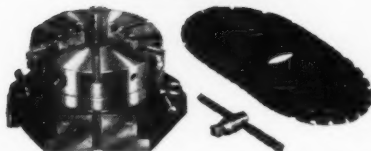
THE APEX MACHINE & TOOL COMPANY
1028 S. Patterson Blvd., Dayton 2, Ohio





**ELIMINATE
EXPENSIVE
JIGS AND
FIXTURES**

with
**HARTFORD SPECIAL'S
SUPER-SPACER**



12" Super-Spacers come complete with 48 notch Master Index Plate, eight mask plates for 2, 3, 4, 6, 8, 12, 16 and 24 divisions. Socket wrench included. Special index plates can be furnished.

This versatile indexing device, the 12" Super-Spacer, is ideal for many types of machining on either long or short runs. It is ruggedly constructed for long foolproof operation, yet is fast and accurate. Through hole permits use of a centering plug or passage of work up to 4" in diameter. The Super-Spacer is also available in the familiar 8" size. To up your production, write for new Bulletin.

When it comes to production

**AUTOMATIC
DRILLING
& TAPPING
MACHINES**



**AUTOMATIC
THREAD
ROLLERS**

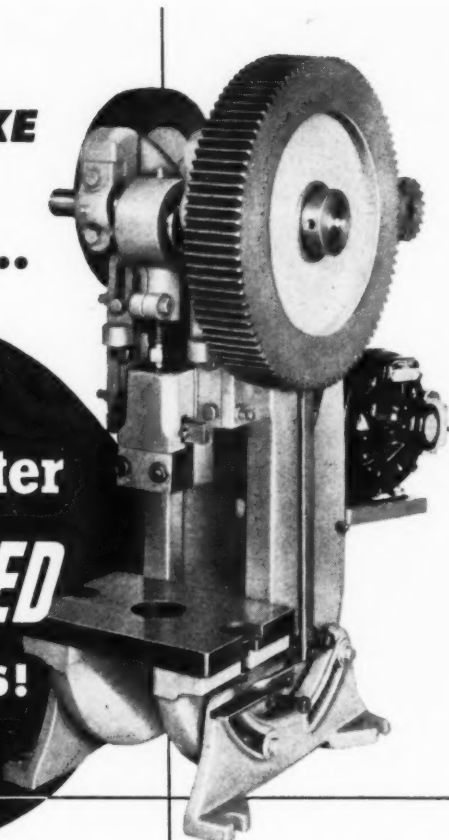


HARTFORD
Special

THE HARTFORD SPECIAL MACHINERY CO., HARTFORD 12, CONN.

**When a
SLOW STROKE
will speed
production...**

**GET A
benchmaster
BACK-GEARED
PUNCH PRESS!**



Benchmaster gives you the answer to deep-draw and forming operations on small presses...The new **BACK-GEARED** Series! Built to the same rigid specifications as standard and deep throat models, but now equipped for **SLOW, POWERFUL STROKES** ranging from only 40 to 100 per minute! Benchmaster Automatic Friction Roll Feeds available in several roller widths for automatic feeding.

benchmaster
MANUFACTURING COMPANY

1835 West Rosecrans Ave., Gardena, California

Available in 3 Sizes:

4 Ton Standard
4 Ton Deep Throat,
7½ Ton models.
Shut heights and other
general specifications
remain the same as
standard models.

Ask for facts today!

P.S. You still enjoy
Benchmaster
dependability and
economy on the
Back-Geared Models!

**BOOST PRODUCTION...
MAKE DIFFICULT PARTS**

Interchangeable

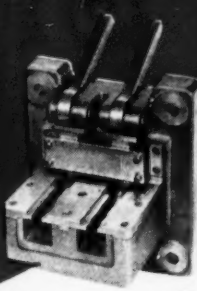


Above: Broaches, consisting of ten individual sections mounted in each holder, rough and finish two complete parts per stroke.

Below: Two-station, cam-type clamping fixture guides broaches throughout the cutting stroke.



Parts before and after broaching.



Continental

BROACHES BY

The half-round slots in these stainless steel aircraft tubing clamps were formerly drilled and reamed. The process was slow. To make matters worse, no two parts were exactly alike.

Continental engineers designed broaches and fixture to do a completely uniform job in far

less time. Parts are now fully interchangeable.

For information on how Continental Broaches may help increase your production, with improved accuracy and finish, call in your local Ex-Cell-O representative or write, wire or phone Continental in Detroit... today.

53-7

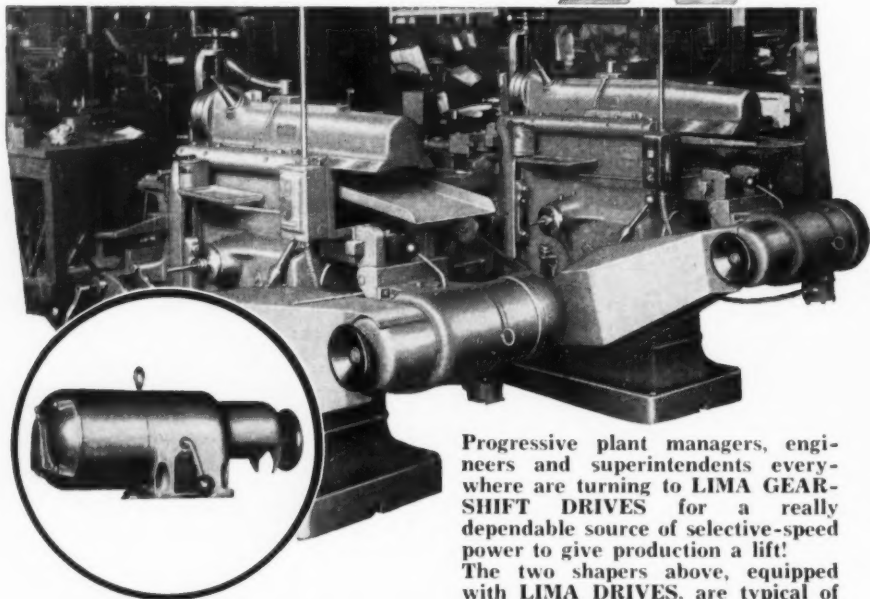
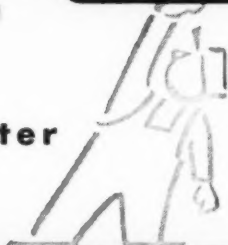
CONTINENTAL TOOL WORKS DIVISION OF **EX-CELL-O CORPORATION**
DETROIT 32, MICHIGAN

LIMA

production
gives

a **LIFT**

at International Harvester
Company Plants



LIMA GEARSHIFT DRIVES

Available for prompt delivery in
constant-horsepower ratings of $\frac{1}{2}$ to
15 HP. Four or eight speeds.

Progressive plant managers, engineers and superintendents everywhere are turning to LIMA GEARSHIFT DRIVES for a really dependable source of selective-speed power to give production a lift!

The two shapers above, equipped with LIMA DRIVES, are typical of the many different types of machines Lima has individually motorized at the Fort Wayne Works of International Harvester Company.

Let Lima survey your machines—get the production advantages you want.

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Representation in principal cities

GEARSHIFT DRIVES & MOTORS

LIMA

THE LIMA ELECTRIC MOTOR COMPANY



260 Findlay Road

• Lima, Ohio

A **HARIG** precision die for **BIG** job performance!

A Harig precision shaving die built to shave teeth on the inside diameter of large ring used in a military vehicle's automatic transmission.



Proven...

- LESS DOWN TIME
- LOWER COST PER PIECE
- PRECISION WORKMANSHIP
- GREATER PRODUCTION
- LONGER DIE LIFE

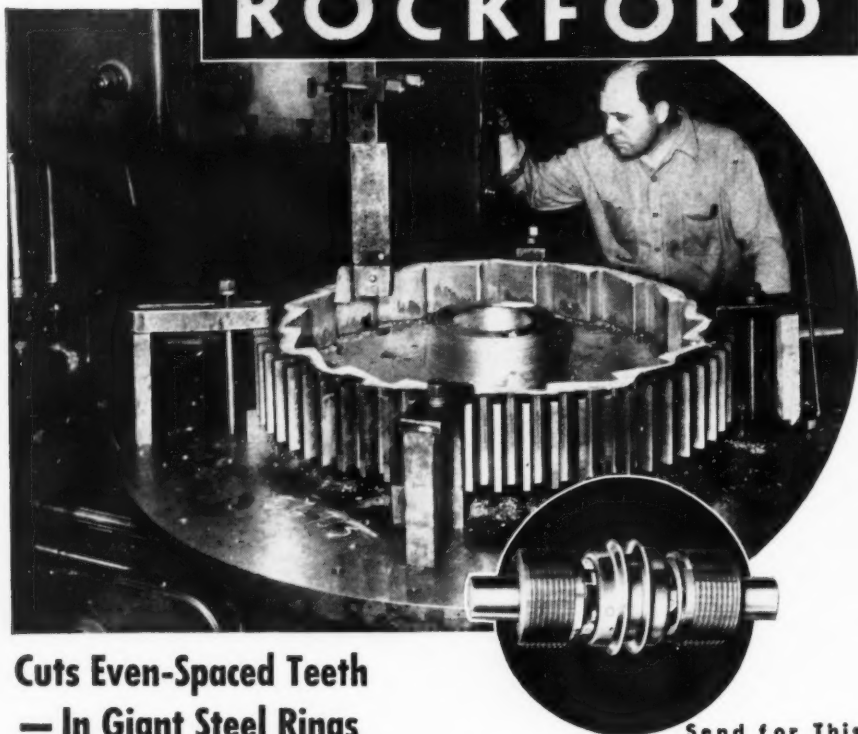
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for your free copy of
**HARIG—"America's Foremost
Precision Diemaker"**

This large Harig die is built for dependable heavy duty performance. It employs sectional tooth inserts for precision shaving of a large ring gear, designed to give outstanding service. Harig designs and builds unusual dies, tools and special machinery for every purpose. Why not consult our engineering staff about that current problem?

HARIG MANUFACTURING CORPORATION

5763 West Howard Street • Chicago 31, Illinois

CLUTCHES by ROCKFORD



Cuts Even-Spaced Teeth — In Giant Steel Rings

Rockford HY-DRAULIC Slotters are well known for their accuracy, flexibility, speed of operation and ease of adjustment. ROCKFORD Pullmore CLUTCHES control the rapid traverse power in these huge slotters, for quick, precise set-up. Let ROCKFORD clutch engineers work with your development department to design power transmission control for your particular needs.

Send for This Handy Bulletin

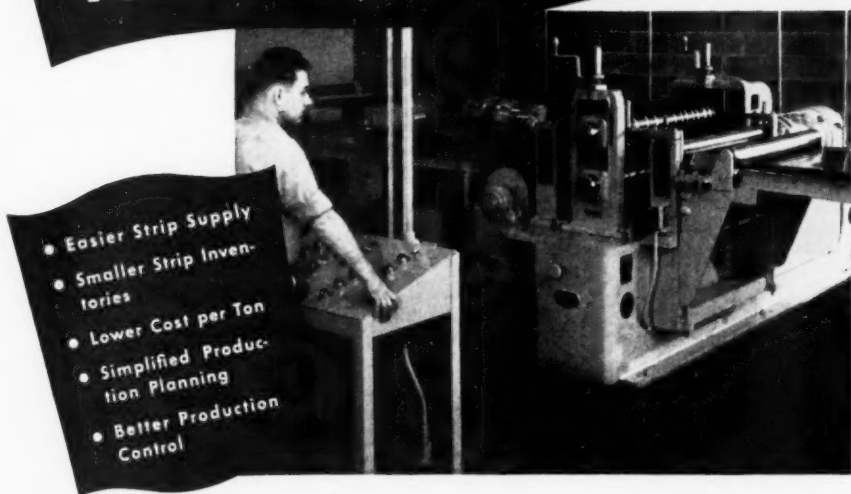
Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.



ROCKFORD CLUTCH DIVISION BORG-WARNER

1309 Eighteenth Avenue, Rockford, Illinois, U. S. A.

YODER *Multiple Rotary* SLITTERS



- Easier Strip Supply
- Smaller Strip Inventories
- Lower Cost per Ton
- Simplified Production Planning
- Better Production Control

IF YOU USE over 100 tons of coiled strip per month, in strands of different widths, you will find a Yoder slitter a most profitable production tool. In times when materials are scarce, it eases your strip supply because you can buy standard widths from a greater number of sources of supply, and at a substantial saving in cost per ton. This saving alone soon pays for your investment.

Deliveries of standard widths are much quicker, avoiding the necessity for ordering long in advance and carrying big in-

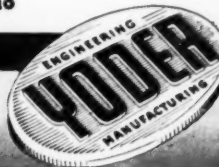
ventories of slit-to-width strands. Consider the convenience of being able to supply your own needs in slit strands, on a few hours' notice, from a relatively small stock of standard width coils. It simplifies production planning, removes a source of constant worry in times of scarcity.

Yoder makes a complete line of rotary slitters for sheets and coils, including coil boxes, uncoilers, recoilers, scrap choppers, coil handling cars, etc. Yoder slitter book is a treatise on the economics of doing your own slitting. Ask for it.

THE YODER CO. • 5509 Walworth Ave., Cleveland 2, Ohio

Complete Production Lines

- ★ COLD-ROLL-FORMING and auxiliary machinery
- ★ GANG SLITTING LINES for Coils and Sheets
- ★ PIPE and TUBE MILLS—cold forming and welding



Cobell Supply Corporation Finds

Airtherm
"METALWORKER"
POWER PRESS BRAKE
Gives Satisfactory Service on Both Steel
and Aluminum Fabrication

H. A. NELSON, Vice-President
Cobell Supply Corporation
Fort Worth, Texas

**Get These 5 Time
and Money-Saving
Advantages**

1. **Built to Take It**—Rugged, welded, single unit construction permits you to operate at full capacity continuously.
2. **Get Started on the Job Fast**—Quick, easy set-up and adjustments means you get started with minimum loss of time.
3. **Save Production Time**—Fast operation combined with "stop on a dime" braking action keeps production flowing.
4. **Smooth Operation, Long Life**—Accurate machining, plus careful assembly and inspection assures a long life of top performance.
5. **A Really Versatile Machine**—Handles all kinds of bending, forming, and multiple punching jobs.

Write for complete information on "Metal-worker" Press Brakes, models ranging in capacity from 18 gauge to $\frac{3}{8}$ " plate.



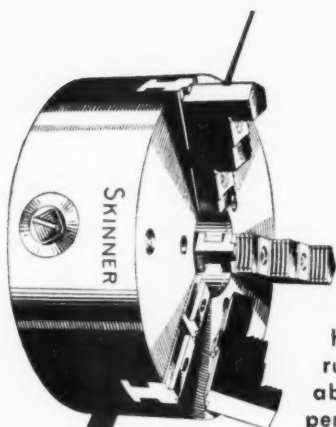
We can handle your requirements for standard dies. Send us your specifications; we'll give you recommendations.

MACHINERY
DIVISION

Airtherm
MANUFACTURING COMPANY

762 South Spring Ave. • St. Louis 10, Mo.

SERVING THE
METAL-WORKING
INDUSTRY
SINCE 1931



The modern, precision-built Skinner chuck line includes types for light, medium and heavy duty, in a wide range of sizes. These rugged, positive-gripping chucks are available in 3-jaw universal scroll, 4-jaw independent, and power models, plus a complete line of air cylinders and other power chucking equipment.

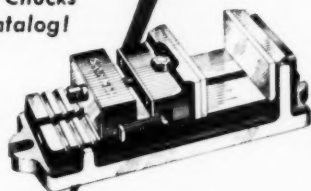
SKINNER

Skinner precision machine vises are unequalled for fast, positive gripping action. They are available in several models, with either plain or swivel base, to handle all types of milling, drilling, tapping, shaping, etc. Your Skinner dealer will be pleased to give details on the complete line of Skinner Chucks and Vises—ask him for free general catalog!



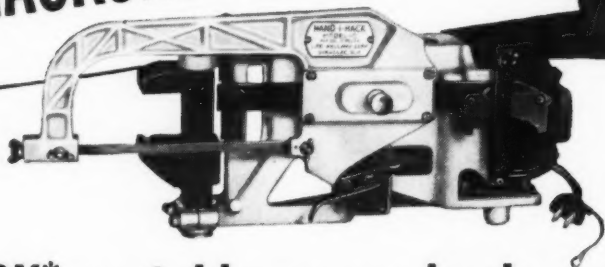
**THE CREST
OF QUALITY**

**Hand and Power Operated
Machine Chucks
Air Chuck Equipment
Face Plate Jaws
Machine Vises**



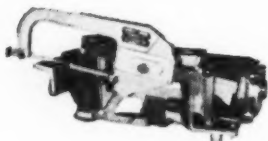
THE SKINNER CHUCK COMPANY
207 Edgewood Ave., New Britain, Conn., U. S. A.

Stop HACKSAWING by Hand!



use

HAND-I-HACK* portable power hack saw



Cuts at any angle up to 45°.



Cuts 3" square steel bar.

HAND-I-HACK eliminates the sweat and unproductive cost of manual hacksawing. Rugged—light in weight—Hand-I-Hack can be carried anywhere in the shop to cut bar stock, angle iron, flexible metal tubing, thin-wall tubing—even 4" I-beams.

Attached to the work, it saws in any position: horizontal, vertical, angular, *upside down*. One-quarter HP motor plugs into wall socket. Motors available for all standard circuits.

Cuts are accurate—saves stock. First cost is low—operating and upkeep cost negligible. Another saving: uses low-cost high speed *hand* blades.

● Write for catalog and name of dealer.

*T.M. Reg. U.S. Pat. Off.

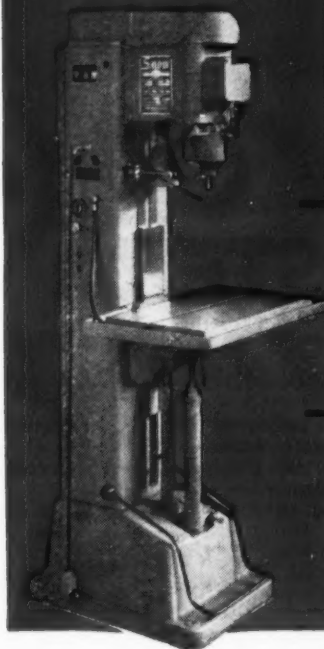


Lipe - ROLLWAY CORPORATION

Manufacturers of Automotive Clutches and Machine Tools

818 Emerson Ave., Syracuse 1, N.Y.

*For Top
Production*



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

SNOW

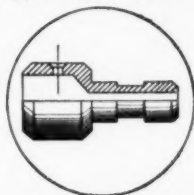
FULL UNIVERSAL MACHINES

Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

DRILLING

Crossdrill and C" T" Sink 1/16" Hole

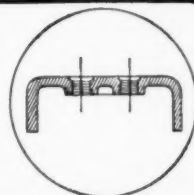
Material—Brass
Production—4800 per hour
Fixture—# 15 Vertical index
Equipment—# 1-UD Drilling
Machine



TAPPING

Tap Two #10-32 Holes

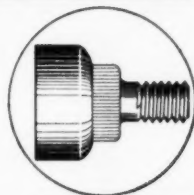
Material—Steel stamping
Production—3800 tapped holes
per hour
Fixture—# 14 horizontal index
Equipment—# 1-UT tapping
machine



THREADING

3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum
Production—2500 per hour
Fixture—# 10 Drum dial
Equipment—# 3-TR Threading
machine



SNOW

MANUFACTURING COMPANY
435 Eastern Ave., Bellwood, Illinois
(Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

Submit Sample Parts for Production & Cost Estimates

**NO. 5 IN A SERIES
OF CASE HISTORIES**
Illustrating how Millers Falls
"Adjustomatic" Clutch Electric
Screw Drivers cut time and cost
on thousands of assembly lines.



400% FASTER—

that's the performance record of Millers Falls Screw Drivers on this exacting job

For years, driving screws on the pulley stops of traverse tracks had to be done by hand. Torque must be held within close tolerances. Too much — and the thin-gauge tracks crush. Too little — and the stops loosen.

But, as on so many exacting assembly jobs, Millers Falls Electric Screw Drivers with the *patented*, super-sensitive "Adjustomatic" Clutch proved ideal for the assignment.

Today, twenty of these powerful, versatile tools are speeding production for a leading manufacturer. Month after month, each drives thousands of screws daily — accurately, uniformly, and 400% faster than was previously possible.

No matter what driving problem you may have, Millers Falls screw drivers, nut runners and stud setters can save you time and money. We've never found a job too delicate — or a job too tough. Write for full details and a demonstration.

MILLERS FALLS COMPANY
Greenfield, Mass.



The Mark of Superiority



SANFORD

SURFACE GRINDER

MODEL MG

For Dry or Wet* Grinding!
PRECISION • SPEED • SENSITIVITY

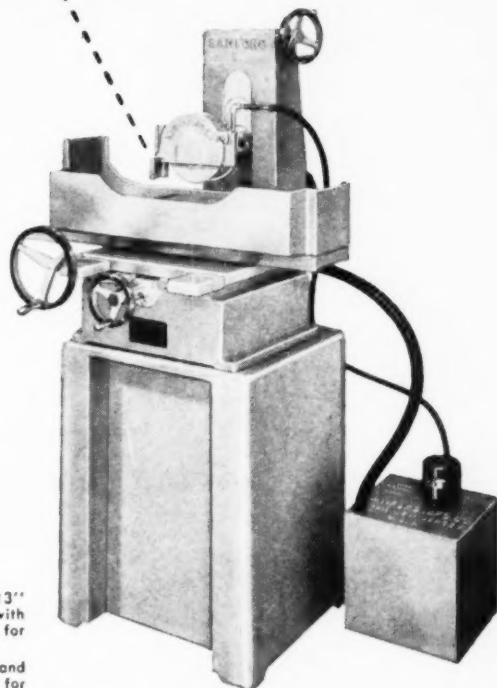
Built by manufacturers who concentrate on small grinders only, each Sanford Grinder is an individual project of time tested and proved basic design. Although modest in price, no quality undermining short-cuts are employed to reduce manufacturing costs. Constant repeat orders prove its acceptance.

This sensitive machine grinds to micro-inch accuracy with no vibration, with maximum dimensional stability. Here's why:

- Transverse ways are double Vee (VV) Mechanite inserts instead of flat surfaces which depend upon unstable jibs for alignment and accuracy.
- Needle, Ball and Oilite Anti-Friction bearings are used throughout.
- Alignments are electronically checked for accuracy.
- Precision slides are ground, lapped and hand spotted.
- Dials are large and legible.

SPECIFICATIONS — 8 $\frac{3}{4}$ " transverse — 13" longitudinal — 12" vertical under 7" wheel with Adapter. Approximate weight 630 lbs. Send for illustrated bulletin.

Replacement parts, special attachments and reconditioning facilities are available. Send for price list.



*With optional equipment

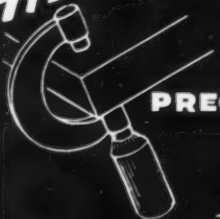


SANFORD

MANUFACTURING CORP.

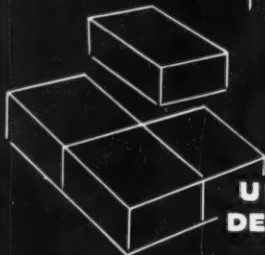
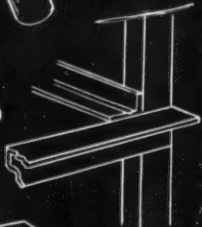
1026 Commerce Ave., Union, N. J.

ALL THIS



PRECISION

**RIGID
STAND**

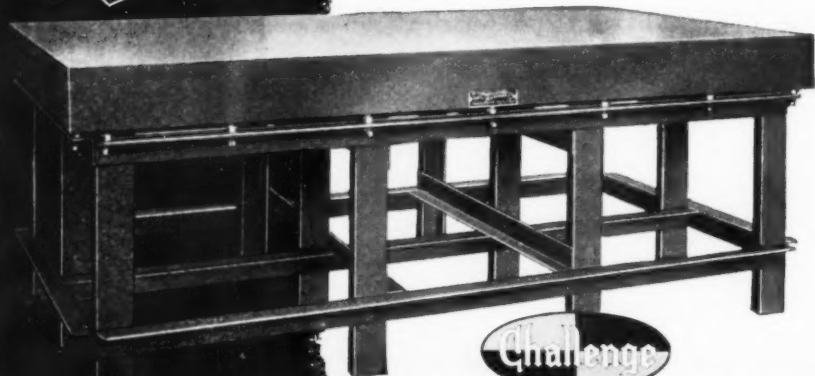


**UNIT
DESIGN**

AND MORE WITH CHALLENGE LAYOUT SURFACE PLATES

Built of fine-grade special analysis semi-steel . . . these plates provide a smooth accurate surface for layout, inspection or assembly work. Six inches thick, 16 standard sizes — 8" thickness and other sizes to order; also special plates with "Tee-Slots" or grooving, scoring, machining as specified. Arc-welded, all-steel stand is equipped with lock leveling screws. Plates can be grooved and keyed so that two or more may be assembled into one complete unit, e.g., four 54 x 144" plates into one 108 x 288" unit. Write for data and prices at once!

670



THE CHALLENGE MACHINERY CO.
GRAND HAVEN, MICHIGAN, Send for Illustrated Catalog

**Faster production
at lower cost**

**MODERN
COLLAPSIBLE
TAPS**

New



**FOR EITHER
STATIONARY OR
ROTARY USE**

Modern Precision Tools
Include

STATIONARY SELF-OPENING
DIE HEADS
ROTARY SELF-OPENING
DIE HEADS
STATIONARY
COLLAPSIBLE TAPS
ROTARY
COLLAPSIBLE TAPS
MODERN-MAGIC
CHUCKS AND COLLETS
SELF-OPENING
STUD SETTERS
INSERTED BLADE
FACE MILLING CUTTERS
SOLID ADJUSTABLE
DIE HEADS
ADJUSTABLE HOLLOW
MILLING TOOLS
UNIVERSAL CHASER
GRINDING FIXTURES

- Easy and quick adjustment. No special tools required.
- Interchangeable shank for convenience in changing from one machine to another.
- Thread length setting undisturbed by diametrical adjustment.
- Extra rigidity with unusually sensitive collapse.
- Simple in design. No complicated mechanisms.
- Heavy chasers for greater strength. Chaser threads precision ground.
- All parts hardened and ground and precision fitted.

Send for full information on this new improved Modern Collapsible Tap and its cost reducing possibilities applicable to your tapping

MODERN TOOL WORKS

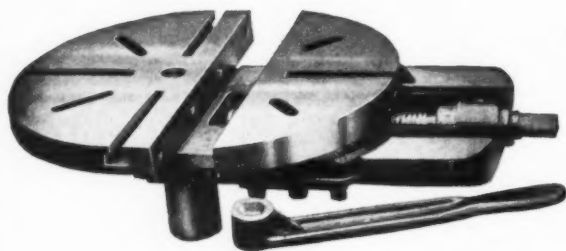
DIVISION

CONSOLIDATED MACHINE TOOL CORPORATION

SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK

Try the MODERN SAFETY DRILL TABLE



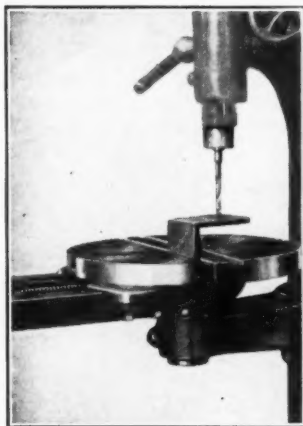
Under Our
**FREE
TRIAL
OFFER**

***For Faster, SAFER Work
in Your Maintenance Department***

Combines a drill table, a vise, a set of parallels and V block. No more lost fingers, from hand held jobs that slip. No more 30 minute set-ups for a 1 minute drilling operation. Made in 6 sizes, from 8" to 28" dia. We guarantee each Safety Drill Table will save its cost on labor alone in 6 months, to say nothing of plant down time when vital maintenance is delayed even a few minutes.

WRITE FOR FREE FOLDER

Shows many typical set-ups, and use on radial drills. Complete specifications on all models. Covers MONEY BACK GUARANTEE and 30 DAY FREE TRIAL OFFER.

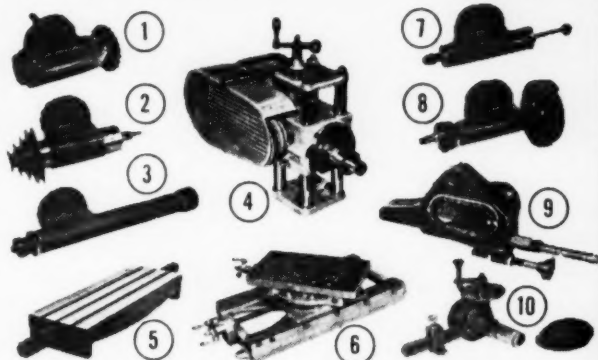


MODERN MACHINE TOOL CO.

Jackson, Michigan

master MACHINE TOOL ATTACHMENTS

for
**LATHES
TURRETS
MILLS**
OR USE INDEPENDENTLY



- | | |
|---------------------------------------|---------------------------------|
| 1. 90° Universal Milling Head | 6. Universal Feed Table |
| 2. Hi-Speed Milling and Drilling Head | 7. Internal Grinder Head |
| 3. Deep-Hole Internal Grinder Head | 8. External Grinder Head |
| 4. Basic Milling Unit | 9. Slotting and Keyseating Head |
| 5. Milling and Grinding Table | 10. Geared Dividing Head |

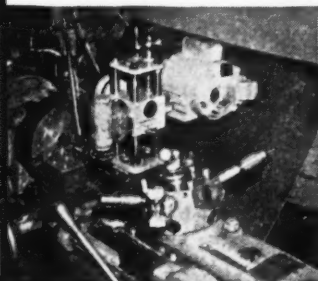
THREE SIZES

MODEL "C," 1/2 hp — 9" TO 13" LATHES
MODEL "B," 1/2 OR 3/4 hp — 13" TO 18" LATHES
MODEL "M," 1 OR 1 1/2 hp — 18" TO 72" LATHES

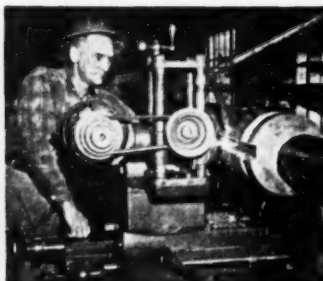
The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, boring, drilling, indexing, slotting, and keyseating, internal and external. Its full complement of equipment is an **outstanding** value for maintenance, repair, tool room, and

experimental shops, as well as production, thus performs a full range of shop operations at a minimum investment. These improved models are outstanding in rigidity, capacity, and simplicity of set-up and operation and incorporate the latest features developed in our 17 years of manufacturing this tool. Investigate this valuable shop tool. For the cost of one single-purpose machine, you can have several Master units producing. Prompt deliveries.

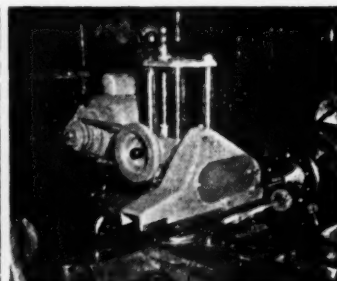
MAKES LOW-COST INDEPENDENT PRODUCTION SET-UPS — PORTABLE — SELF-POWERED



Milling on turret lathe completing part in one set-up



End Milling 2 1/2" keyway in 9 3/4" diameter shaft 22 ft. long



Master Slotting Head on lathe cutting internal taper keyway



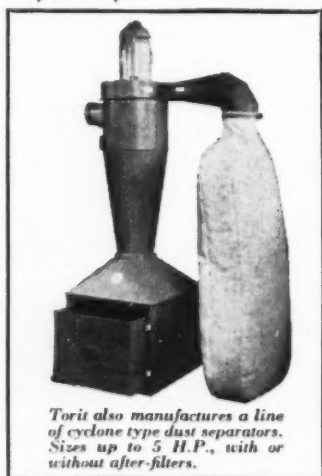
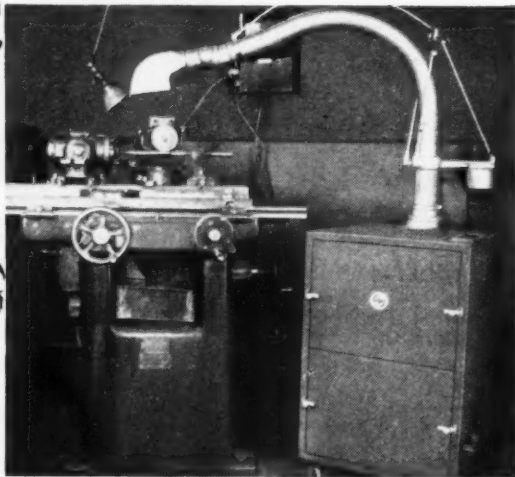
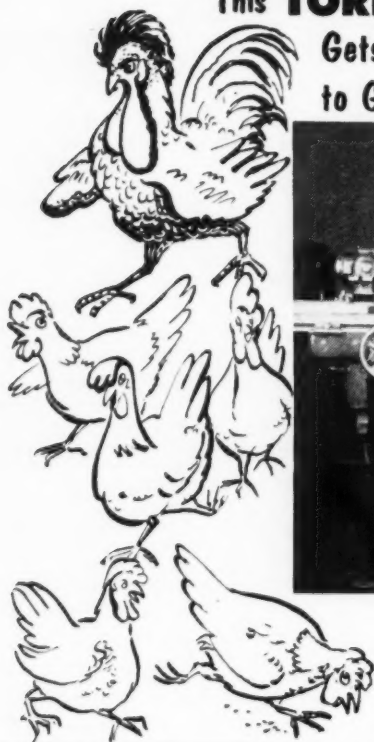
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MASTER MANUFACTURING CO.

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This **TORIT DUST COLLECTOR** Gets Around to Get Results



Torit also manufactures a line of cyclone type dust separators. Sizes up to 5 H.P., with or without after-filters.

In this shop, doing specialized work, several grinding and cutting machines were used intermittently. Odd shapes and sizes, too, were involved. Here the dust problem was solved with a mobile Torit Dust Collector that could be moved as necessary. A Torit flexible suction tube assembly insured nozzle adjustment to the position best suited for the work being done.

Standard model Torit Dust Collectors meet the requirements of most dust collecting operations, and special adaptations can be quickly fabricated. Compact and self-contained they are very economical to install, low in operating costs and very easy to maintain. For details write:

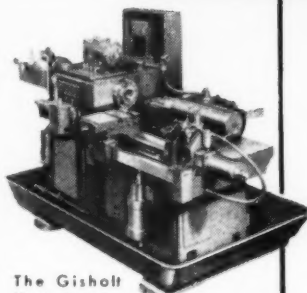
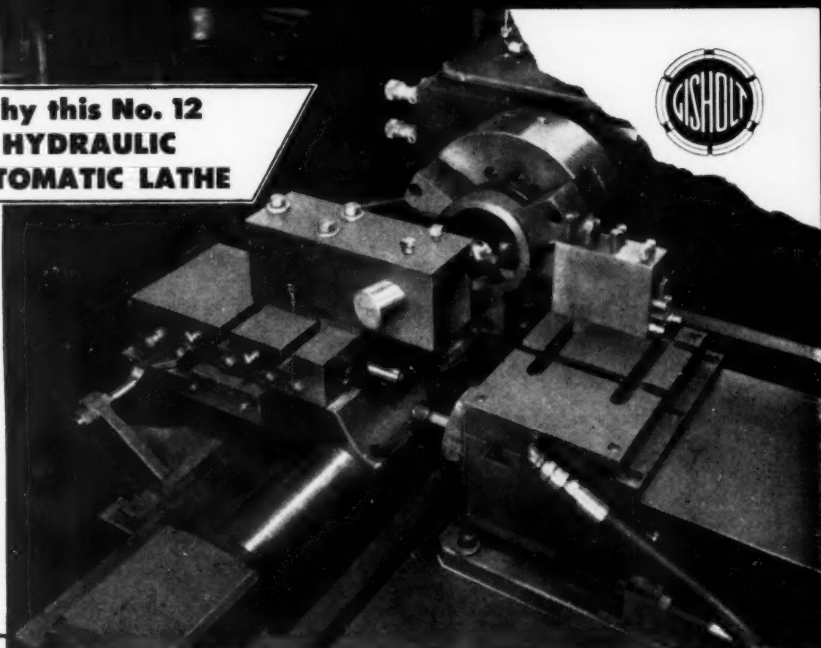
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or write for copy

TORIT **MANUFACTURING CO.**
303 Walnut St. St. Paul 2, Minn.

**why this No. 12
HYDRAULIC
AUTOMATIC LATHE**



The Gisholt Hydraulic Automatic Lathe is a genuinely rugged 12" lathe, suited for light, fast jobs. Handles chucking, between centers, or fixture-held work.

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



**maintains
GREATER ACCURACY**

Here, feed pressures are applied directly to tools without intermediate cams, arms or other linkage. Accuracy is further insured by feeding against dead stops. In all cuts there is a moment of dwell during which cuts are cleaned up.

Front carriage is mounted on and driven by the massive bar to which it is clamped. Wide lateral support of carriage assures rigid alignment without tremble or tremor.

Movement of the massive rear slide is by hydraulic piston in the base of the slide itself.

Both carriages are directly supported by the massive integrally cast cabinet type bed, and all bearing surfaces, ways and gibs are hardened and ground steel to assure permanent accuracy.

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MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

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STEEL PLATE SHAPES

WITHOUT COST
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WITHOUT
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MANPOWER?

*By-Products works directly from blueprints . . .
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*The LONG and SHORT
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From four inches to fifteen feet, there's an
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Manufactured of specially selected STAINLESS
STEELS — HARDENED and NORMALIZED —
ETALON CALIPERS are helping to maintain
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Whenever you require accurate and dependable
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SPECIFY ETALON TO BE SURE OF THE FINEST!



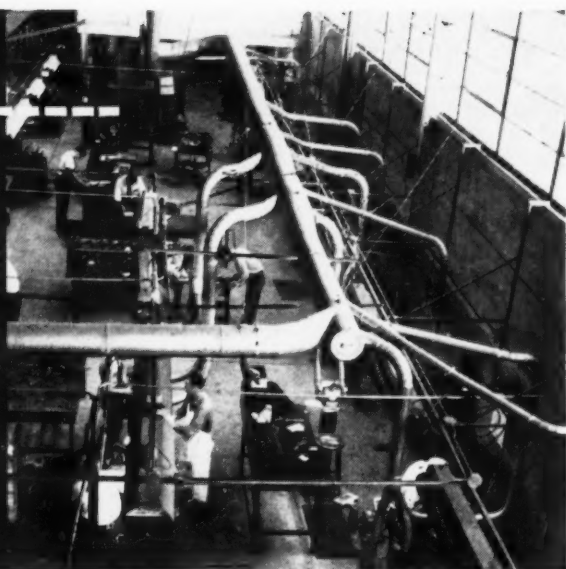
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ROTO-CLONE

**"Grounds" Dust
at
Solar
Aircraft**



Compact Type D Central System Services 14 Dust Sources in Busy Tool Room

Good housekeeping encourages good workmanship. That's why Solar Aircraft, San Diego, Calif., producer of vital aircraft parts, has applied AAF Roto-Clone* Dust Control throughout its tool room.

Fourteen dust sources, including bench, cutter, drill and surface grinders, are serviced by a single Type D Roto-Clone—the dynamic precipitator which combines the functions of exhausting, separating and storing dust in a single unit. Note how its compact design permits location near dust sources—holding piping to a minimum and concentrating dust storage at one convenient disposal point.

The Type D Roto-Clone can be adapted to any metal grinding or finishing operation.

When dust sources are grouped (as above), it can operate as a central system. For the isolated job, there's a Type D of a size and capacity to serve the individual operation. In all cases, the Type D's high collection efficiency, low operating cost and compact design result in an efficient, economical installation.

Why not have an AAF representative make a "dust check" of your metal working operations? If you have a problem, he has the solution. Call him today or write us direct.

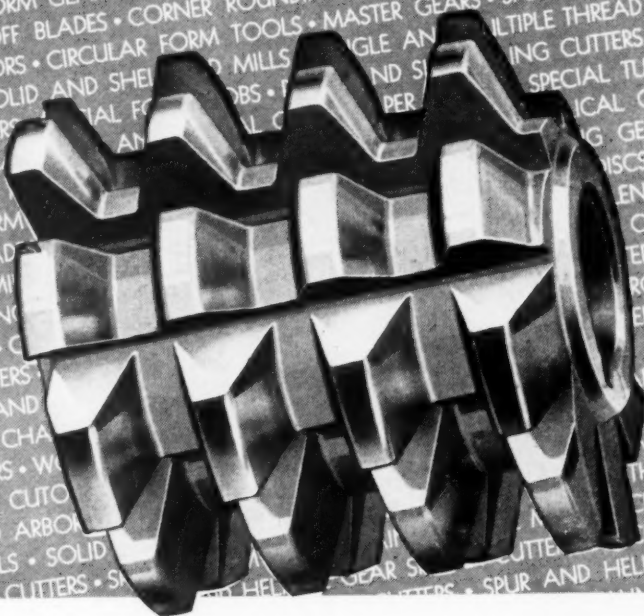
**ROTO-CLONE is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

American Air Filter
COMPANY, INC.



312 Central Avenue, Louisville 8, Ky. • American Air Filter of Canada, Ltd., Montreal, P. Q. • Pacific Division Office, San Francisco, California

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National Tool Co.



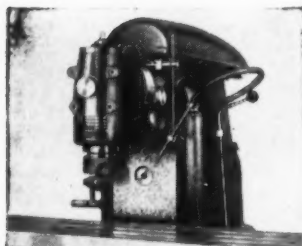
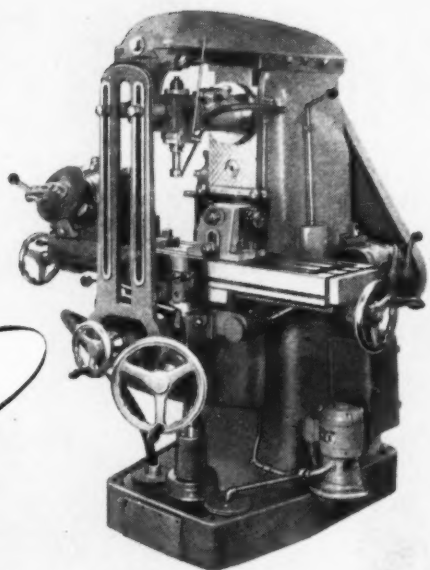
● Years of successful experience in *special* tooling and related production problems are yours for the asking. When the job requires *special* cutting tools call in your National Tool Co. representative. He is backed by more than 46 years experience in the engineering and manufacture of *special* cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.

Representatives in major industrial centers.

Since 1905 engineers and manufacturers of high-quality special cutting tools for the metal-working industry

National
TOOL CO.
Cleveland 2, Ohio

*Swedish
Craftsmanship!*



Sajo Vertical Milling Attachment

The Sajo "Plain" Milling Machine



the **SAJO** "UNIVERSAL" MILLING MACHINE

exemplifies the expert workmanship that is traditional in Swedish machine tools. Like all SAJO Millers, this new Universal Milling Machine was designed and built to the highest standards of quality and practical utility.

Avoidance of exterior "luxury" features, slight in value but substantial in cost, and concentration on the vital factors of construction, enable the SAJO to deliver top performance at moderate cost.

SAJO Millers are available in Plain and Universal types, with longitudinal power table feed only, or with power feed in all directions. Screws and dials are in the U. S. inch system.

★ **Standard Equipment Includes:**

3 HP motor and starter equipment, motor driven coolant system, adjustable table feed nut to allow climb-milling, T-bar, arbor support brace.

★ **Extra Equipment:**

Universal Dividing Head, Vertical Milling Attachment, Slotting Attachment, Swivel Base Vise, Rotary Table.

CONDENSED SPECIFICATIONS

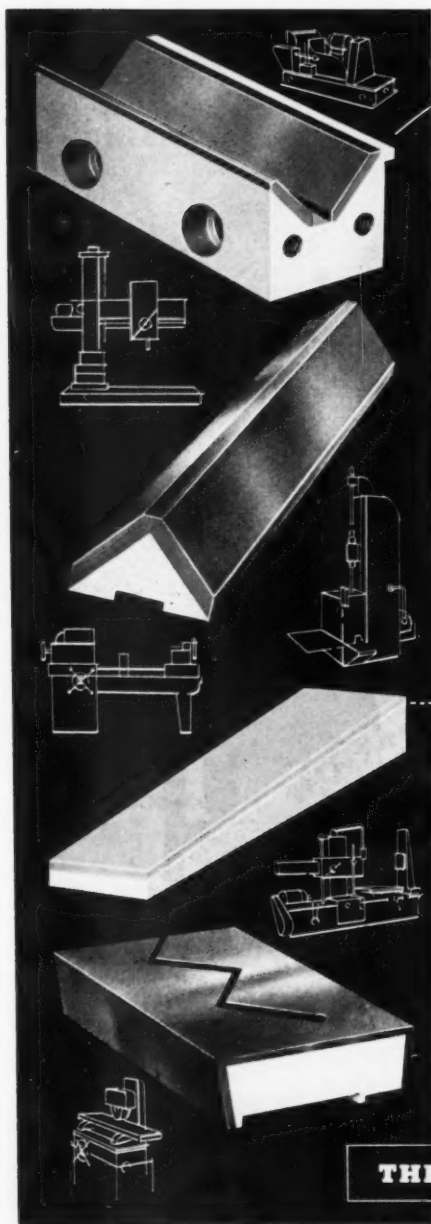
Table Size 41½" x 9¼"
Longitudinal travel: Plain Miller 24½"
Universal Miller 27½"
Transverse travel 8¼"
Vertical travel 19"
12 spindle speeds 36-1540 RPM
Table feeds No. 40 NMT
Taper in spindle 12
Main motor 3 HP

Precision anti-friction bearings on spindle and gear shafts
One-piece column and base
Net weight - 2200 lbs.

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AUSTIN INDUSTRIAL CORP. 76-G MAMARONECK AVE.
DEALERS IN PRINCIPAL CITIES WHITE PLAINS, N. Y.



it's **OK**

**let'em go with OK
hardened ways, gibs,
ball races, and Ampco
bronze wear strips**

The ultimate success and accurate life of your machine depends to a large extent on the accuracy, and uniform high hardness of its ways, gibs, ball races or wear strips. OK parts are the finest. They are made of special tool steel welded to a backing of soft tough steel under 2500 tons pressure, then hardened to a Rockwell C-65-66 and ground to tolerances of $\pm .00015$ (both straight and parallel). They are available in all sizes and shapes, to meet your particular requirements.

OK wear strips are now available in welded Ampco bronze. Because of the OK's special bi-metal method of welding, less bronze is required. These ways are ground to close tolerances thus reducing manufacturing and assembly time.

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**Manufacturers for the Metal Working Industry of
Slitter Knives, Shear Blades, Rotary Shear Knives,
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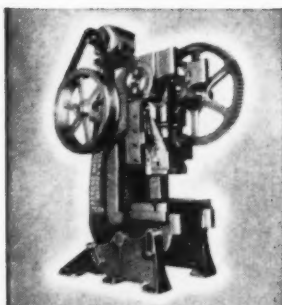
OHIO KNIFE CO., DEPT. D
Cincinnati 23, Ohio

Please send free Bulletins on
OK ways, gibs, etc.

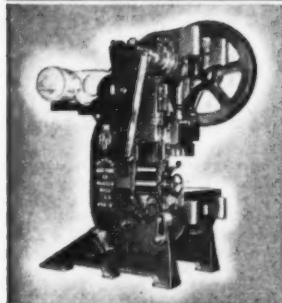
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COMPANY _____
ADDRESS _____
CITY _____ STATE _____

THE OHIO KNIFE CO.

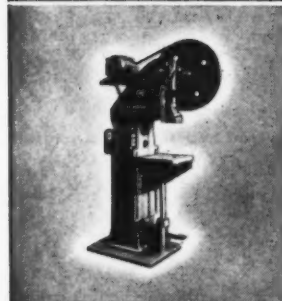
CINCINNATI 23, OHIO



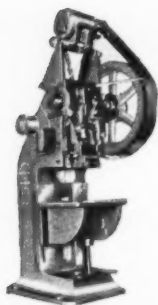
#700 B GEAR PRESS



650-B PLAIN FLY WHEEL

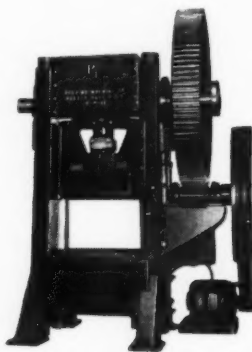


3G HORN PRESS
WITH ADJUSTABLE TABLE



No. 55G WITH ADJUSTABLE BED PRESS.

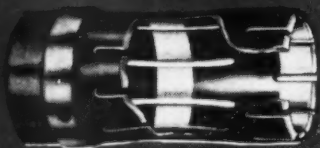
Illustrating a few of the many types and sizes of standard Perkins Presses. Presses built to customers' special specifications.



No. 12-H-36 STRAIGHT SIDE, SINGLE CRANK
TIE-ROD CONSTRUCTION PRESS

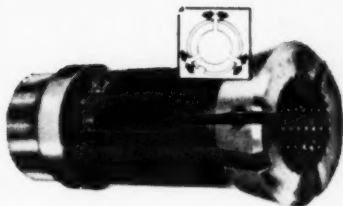


PERKINS MACHINE CO.
WARREN, MASSACHUSETTS



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"Economy" pusher has dual bearings. Gives positive grip with less pressure. More pieces per bar. Also "BB" master with 1 piece insert, conventional and "squirrel cage" pushers.



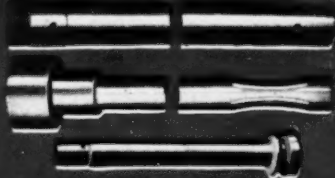
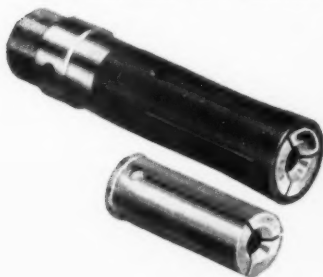
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Standard sizes and designs for all types of automatic screw machines, lathes, milling machines. Special collets made to your prints.

meet the demand for precision...
SHEFFER PRODUCTS ARE BEST
 ...with tools that make precision easy

"BB" BETTER BEARING PUSHER

Single insert holds stock in most cases to full rated capacity. Reduces stress and wear. Easy to stock and assemble. Made in 4 materials.



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Collet tubes and pushers, tubes with spoons, etc., collet tube adjusting nuts, pusher tube bushings for all automatic screw machines.

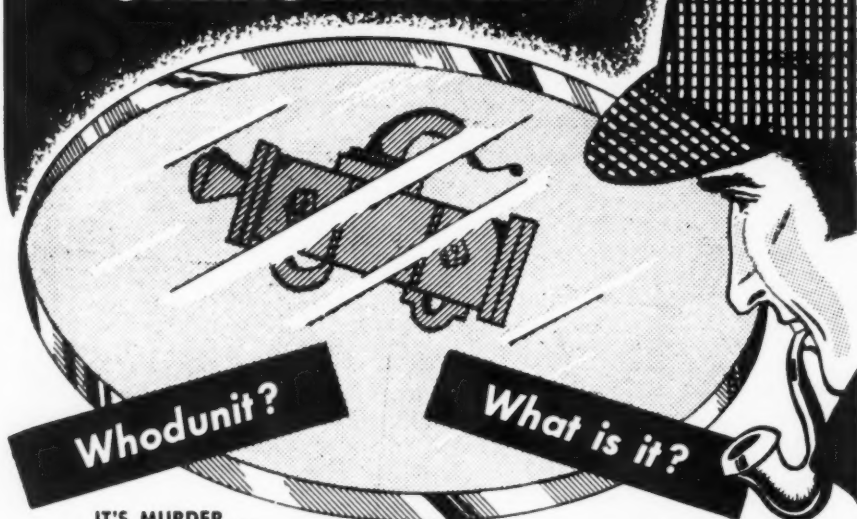
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COLLET COMPANY

TRAVERSE CITY • MICH.

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IT'S MURDER...

... for your customers to try to reorder metal parts which aren't properly marked.

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SOLVE THE MYSTERY—

Mark 'Em for Profit...

... with impressions that help you in a hundred ways! Your name, model number, part number, operating instructions, dec-

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Simply send prints or samples of parts to be marked, together with exact lettering and its location, for free recommendations.

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... It will help you choose the marking equipment—from hand stamps to marking machines—that will suit your *exact* needs.

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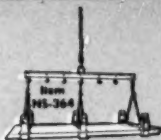


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Handling Equipment



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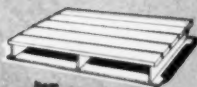
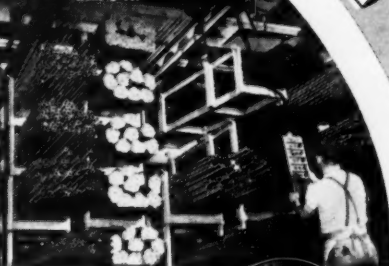


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PORTABLE Heavy Duty BAR RACKS
Any Rack Easily Accessible

Item C-497



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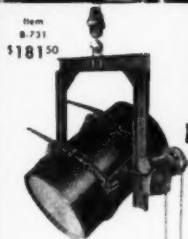
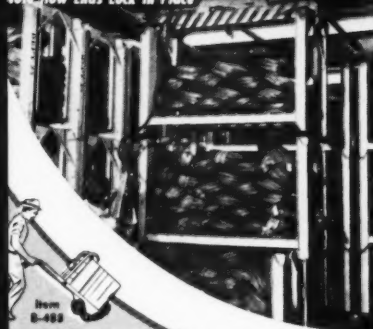


AIR SAVER
leak proof AIR VALVE

STACKING RACK

Item C-496

Loaded by Single Operator.
Note How Ends Lock in Place

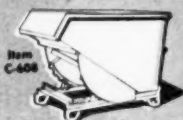


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A barrel tilt for controlled, precision dumping or pouring. Ideal for chemicals, solvents, powders, etc. Turns 360° through worm drive. Equipped with two safety type locking devices and all-steel, welded yoke. Hand-operated chain drive.



WOOD BOX
metal bound



Automatic END DUMP



Industrial DUST PAN



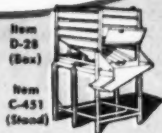
CARBOY TRUCK



CORE RACK



UTILITIES RACK
on wheels



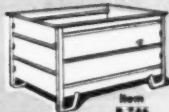
Sloped Bottom BOX and STAND



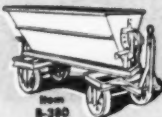
BARREL TRUCK
loads automatically



MULTI-PURPOSE CART



CORRUGATED BOX
with legs



TRAILER TRUCK
side dump

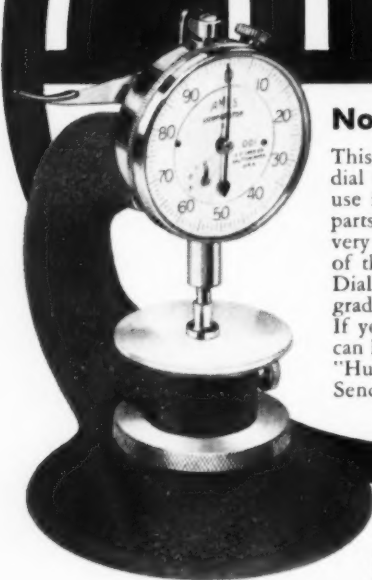
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Palmer Shile Co.

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AMES



No. 2 Dial Comparator

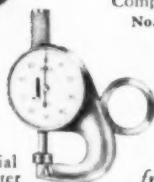
This is smallest in the Ames' line of high quality dial comparators. It is ideal for desk or bench use in the fine inspection of small precision parts. Light in weight, its broad base makes it very stable. The capacity approximates that of the regularly supplied Ames No. 202 Dial Indicator which has a 0-100 dial, graduated in .001", with a .250" range. If your job requirements differ, you can have the No. 2 with any Ames "Hundred Series" Dial Indicator. Send for details.

Ames Long
Range Dial
Indicator
No. 2822

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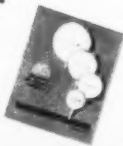
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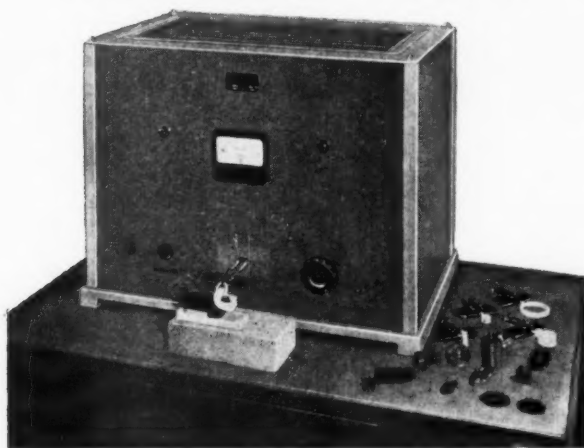
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presents

A Low Cost PORTABLE HIGH FREQUENCY *Induction* HEATING UNIT



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Conveniently operated on bench or table—no mounting necessary.

• **ECONOMICAL OPERATION**

No special power installation required. Operates on 110 volts, 60 or 50 cycle line at unity power factor.

• **FULLY GUARANTEED**

Guaranteed for continuous duty cycle and stated performance.

This versatile unit is priced so low that every shop may now take advantage of modern induction heating techniques to improve quality and to increase production. Its simplicity of operation eliminates the need for skilled personnel.

The Lepel Model 2 KW will meet the requirements of machine shops, toolrooms, research laboratories and educational institutions. It is especially suitable for hardening, brazing and soldering small parts of either ferrous or non-ferrous metals.

WILL HEAT TO 1500° F.

| | |
|-------------------------------------|------------|
| 1/8" steel rod 1" length in approx. | 1 second |
| 1/4" " " " " " " " " | 3 seconds |
| 3/8" " " " " " " " " | 15 seconds |
| 1" " " " " " " " " " | 60 seconds |

Will melt 4 ounces of brass or steel in 4 minutes.
Equally well suited for heating of non-ferrous metals.



BRAZING

Permits widest choice of silver or copper brazing alloys from lowest to highest melting points. Ideal for brazing outside tips.



HARDENING

Heat localized exactly where wanted at desired temperature. Ideal for gears, cams, bearing surfaces, cutting tools and other areas that are subject to wear.



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Speedily and neatly performs last-rate soldering applications with or without the use of pre-formed rings.



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Ideal for annealing, stress-relieving, normalizing or pre-heating selected areas.



MELTING

Readily melts quantities of ferrous and non-ferrous metals in either graphite or ceramic crucibles.

Complete unit with line connection and lead coil.

\$870.

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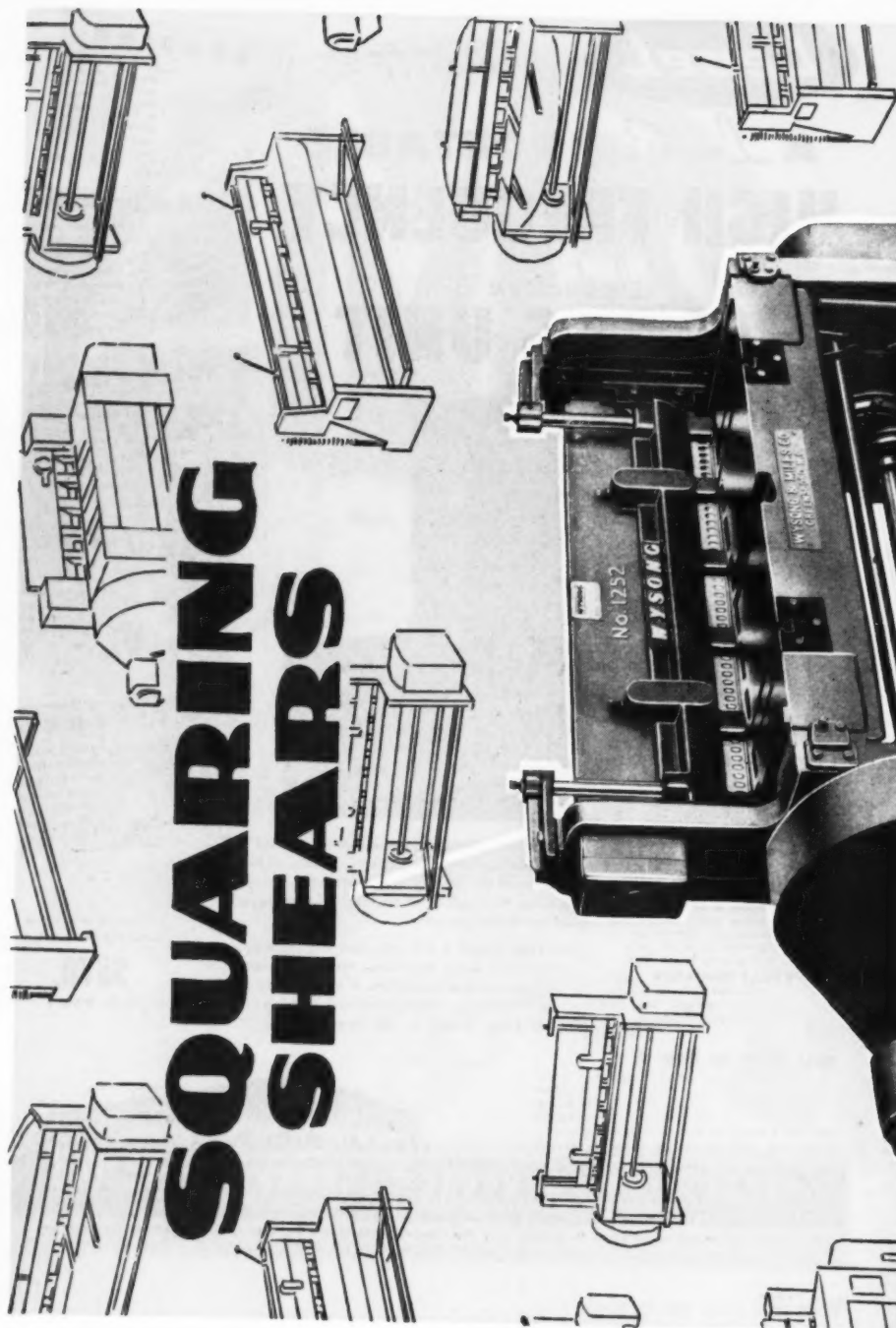


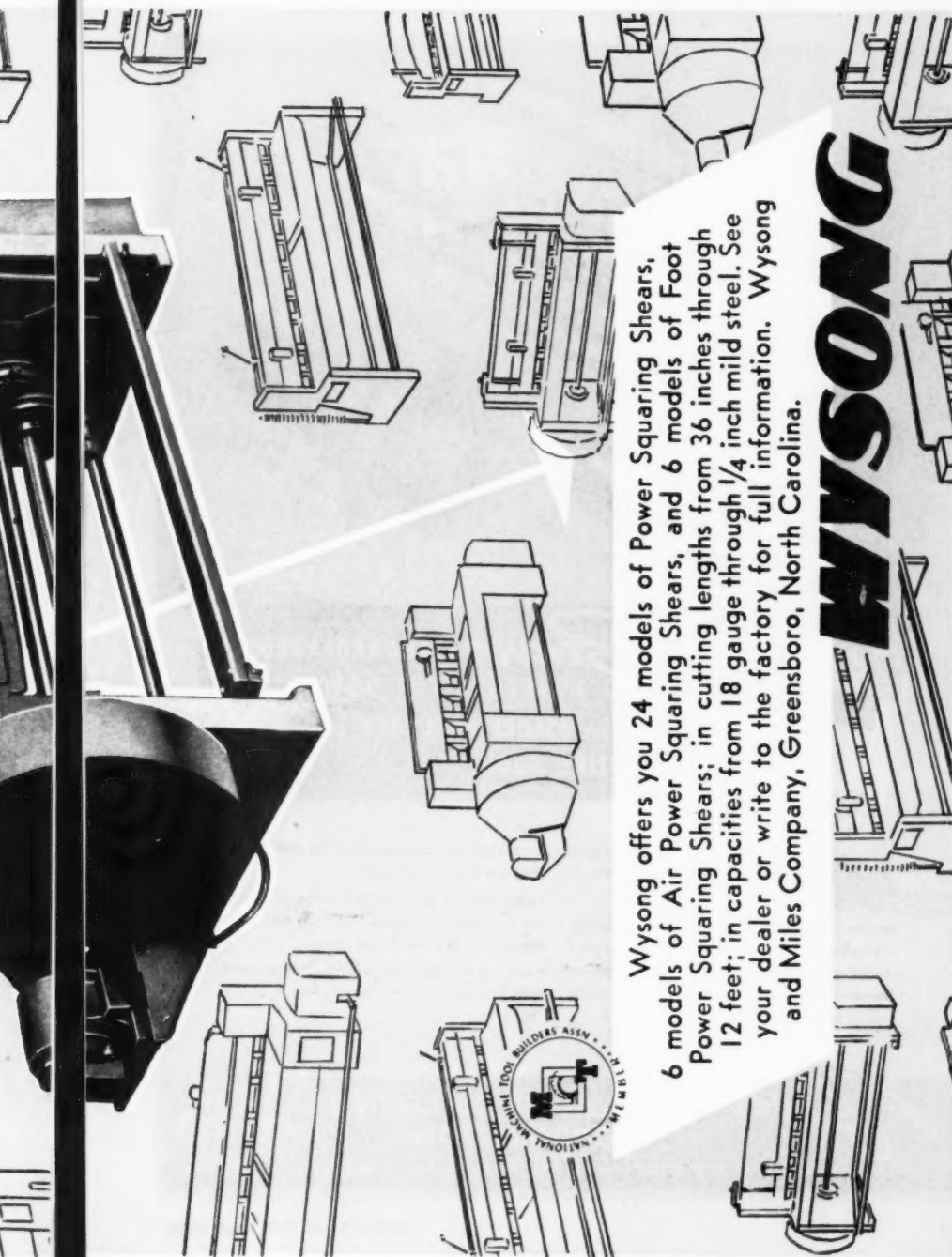
LEPEL HIGH FREQUENCY LABORATORIES, INC.

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Wysong offers you 24 models of Power Squaring Shears, 6 models of Air Power Squaring Shears, and 6 models of Foot Power Squaring Shears; in cutting lengths from 36 inches through 12 feet; in capacities from 18 gauge through 1/4 inch mild steel. See your dealer or write to the factory for full information. Wysong and Miles Company, Greensboro, North Carolina.

WYSONG





Beaver STANDARD ARBORS
AND ADAPTORS CUT DOWN-TIME
LOSS—ASSURE ACCURACY FOR YOUR
CUTTING TOOLS!



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Beaver Standard Tools are made to unusually high standards of quality. No stinting is permitted on workmanship or materials. Beaver Standard Tools are made with the same care and accuracy as precision aircraft parts . . .

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CORPORATION

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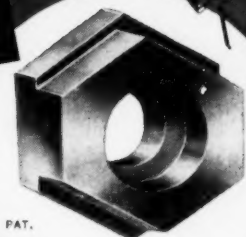


VLIER

FIXTURE KEYS KEEP IDLE MACHINES BUSY

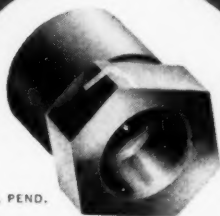
Vlier Multi-Dimensional Fixture Keys are simple, counter-bored hex nuts, having step-out sides. They are milled from oversize stock to different cross dimensions which are accurate to $\pm .0005"$. By placing these keys in your fixtures, they can be accurately positioned and worked on any idle machine without expensive re-work time. Each key fits three different slot dimensions and eight combinations of sizes are available. All are rust-resistant. Dimensions remain accurate. Truly, they are inexpensive time-savers.

Reamed Hole Fixture Keys were developed for users who do not want to use milled fixture keyways. These units have the same accuracy and positive alignment as Vlier milled slot fixture keys. Ask your nearby Vlier distributor to demonstrate their many time-saving features. Send today for catalog No. 57.



PAT.

MILLED SLOT FIXTURE KEY



PAT. PEND.

REAMED HOLE FIXTURE KEY



VLIER ENGINEERING, INC.

4552 BEVERLY BLVD., LOS ANGELES 4, CALIF.

Distributors of Spring Plungers, Torque Thumb Screws, Toggle Pads, Spring Stops.

Those Who Know Best



Buy JOHNSON BAND SAWS

Best Value for the Money — Best Performance

Engineers and Master Mechanics appreciate the plus-value of Johnson Saws . . . the dual frames mean accurate cutting and maximum blade life . . . the 3-point suspension eliminates twisting . . . the heavy axles, etc., all mean one thing to the engineer—VALUE

MODEL J pictured . . . Cuts 10" rounds, 18" flats. Available as a wet or dry cutting machine.

MODEL B also available, a smaller machine . . . Cuts 5" rounds, 10" flats; furnished with or without casters. Really portable. Can be taken anywhere for on-the-job cutting.



There is a Johnson Dealer near you

JOHNSON MANUFACTURING CORP.
ALBION, MICHIGAN



Gosh, I Wonder
WHEN
We'll Get that
Special Machine?

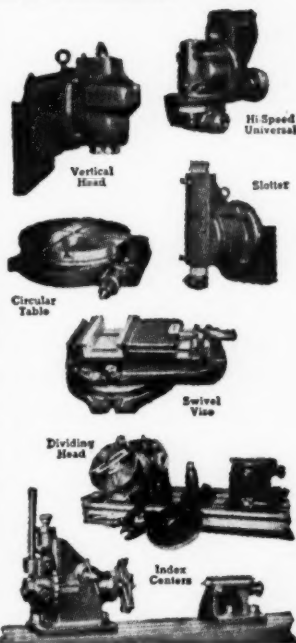
Why wait? Perhaps the Job Can be Done on a Standard Machine with Kemp Smith Attachments

You know—it's really surprising how many difficult milling operations can easily be handled by Kemp Smith Standard Attachments mounted on a standard milling machine.

Manufacturers faced with urgent production schedules are utilizing Kemp Smith Standard Attachments to help solve their milling problems. These precision-built accessories are made to perform the most delicate milling operations, with speed and accuracy. They frequently eliminate the need for special, single-purpose machines, at the same time reducing production costs to rock bottom.

Look to Kemp Smith for milling machines, attachments, arbors and accessories. They are backed by more than 60 years specialized experience in this field.

Write for bulletins describing Kemp Smith Standard Attachments, Arbors and Accessories



KEMPSMITH MACHINE CO., 1827 S. 71st St., Milwaukee 14, Wis., U.S.A.

KEMPSMITH

Precision Built Milling Machines Since 1888

A 5950-1/21-C

Glenzer

ADJUSTABLE ADAPTERS

for Multiple Spindles



These Adapters allow for adjustment of tool up or down in any spindle and are commonly used in multiple spindle operations. Adjustment is made by a nut on National Acme threads. Positive drive is through a Woodruff Key — hold back friction is secured with an Allen Set Screw.

Made of selected material, properly heat treated and accurately ground. Small diameter of nut allows use on spindles with close centers. Comprehensive range of sizes to fit Morse Taper holes 1 to 4 — Adapter sizes $\frac{3}{4}$ " to $1\frac{7}{8}$ ".

Write for complete data — Ask for Index File B

THE J. C. **GLENZER** CO. Inc.

1546 E. NINE MILE ROAD, DETROIT 20, MICH.



Meet your B-RIGHT-ON dealer

Just as you must know your customers' needs . . . he knows yours. He really understands . . . as does every Brighton franchise holder . . . the uses and applications of socket screws . . . and is ready at any time to advise you.

One of his most important functions is to give you prompt service. He's johnny-on-the-spot . . . filling your order from his adequate stock, backed up by centrally located Brighton factory stocks.

He's proud of Brighton Screws . . . they're a real quality line . . . meeting all of your requirements, including the highest standards of strength, accuracy and uniformity.

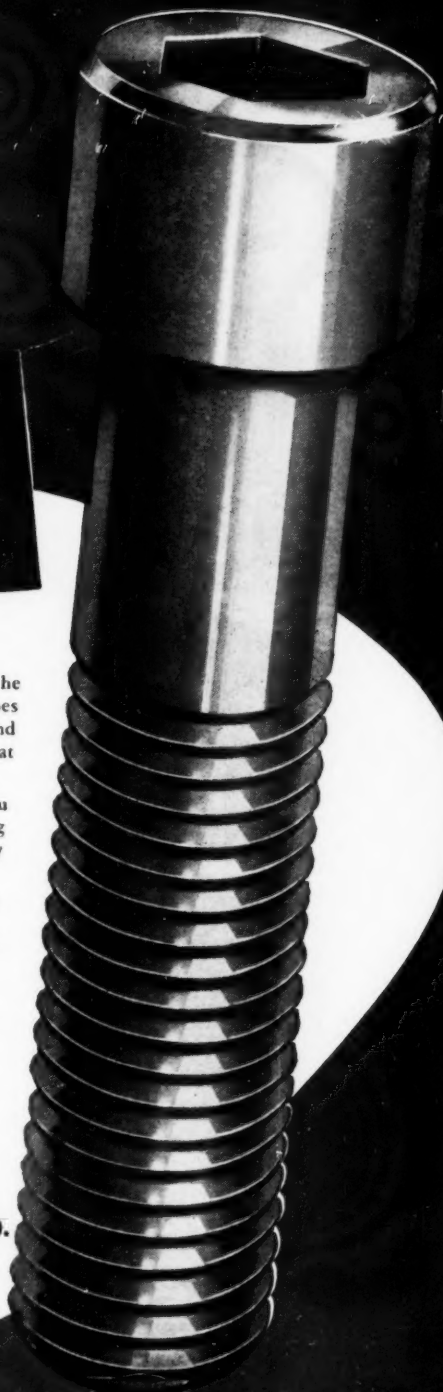
Make your Brighton dealer a member of your production team . . . get his help on *any* socket screw question. If you're not already acquainted . . . write for his name.

- Socket Set Screws
- Socket Cap Screws
- Socket Head Stripper Bolts
- Socket Pipe Plugs

THE BRIGHTON SCREW & MANUFACTURING CO.



1839 Reading Road
Cincinnati 2, Ohio





NEW many purpose individual Vulcanaire

DUST COLLECTING UNITS

Use on surface and other grinders where any kind of grinding dust must be removed. Salvage diamond dust.

Inexpensive, compact units, with no moving parts.

Operated from your present air supply.

Installed in a few minutes, eliminating need for costly centrally located dust collecting systems.

The collector element is mounted on the side of the machine. Quickly cleaned, requiring no refills.

Vac-suction pick-up device (vacuum nozzle) is mounted on the grinding wheel guard or close to grinding wheel on other applications. This mounting permits constant contact with dust as the wheel is moved up or down.

A simple needle valve operates the unit, and can be shut off when machine is not in use.

Available in two sizes: 700 series for grinding wheels 7" dia. or less—200 series for wheels 2" dia. or less.

"SALVAGE INDUSTRIAL DIAMONDS FOR DEFENSE"*

*That is the title of the National Production Authority's booklet which describes the growing critical shortage of industrial diamond supplies.

The shortage will soon result in idle machine tools, and lost defense production unless we straightway begin to conserve grinding wheels and salvage diamond dust. The N.P.A. fully and helpfully explains the methods for doing these things.

Request this N.P.A. booklet on your letterhead and Vulcan will be glad to send it to you. You will also receive literature on the versatile Vulcanaire Dust Collector which promotes health in your plant and turns dust into money.

It's made by the makers of Vulcanaire
The jig grinding attachment

VULCAN TOOL CO., Highland & Lorain Dayton 10, Ohio

Because your Blanchard Grinder deserves the best

USE BLANCHARD GRINDING WHEELS



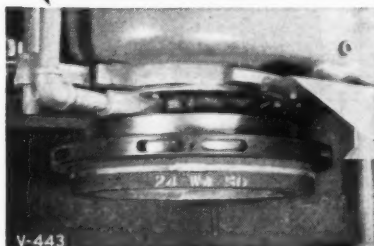
25 years of experience in building both grinders and wheels puts Blanchard in a unique position to give you the best results in surface grinding. There is a *correct* Blanchard Wheel for your work, whether it is as tough as copper or fragile as glass — whether it involves long or short runs — whether it demands heavy stock removal or finishes to 1 microinch — whether it requires clean-up cuts or flatness to .000005"! Top economy and production result only when you use the correct wheel for each individual job. Your nearest Blanchard representative will be glad to put his experience to work for you.



THE BLANCHARD MACHINE CO., 64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

Also investigate **THE BLANCHARD CYLINDER WHEEL HOLDER!**

This new device eliminates sulphuring and thus reduces downtime. It's a real time, money and trouble saver. Grinder head is merely lowered onto wheel — clamps quickly secure the wheel — you're ready to grind! Available for 10", 11", 16", 18" and 20" Blanchard Wheels.



COUPON

Please send free copy of Blanchard Wheel Booklet and Wheel Holder Folder.

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ STATE _____

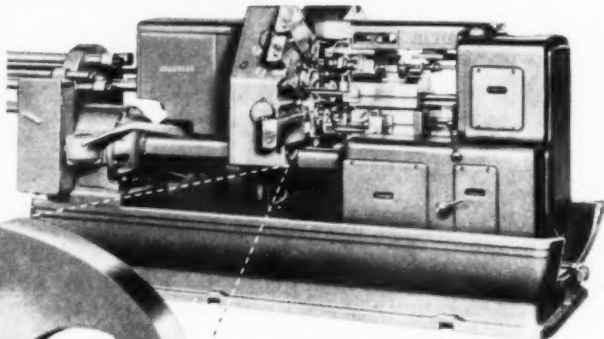
GREENLEE

Automatics

INTERCHANGEABLE CROSS-SLIDE CAMS

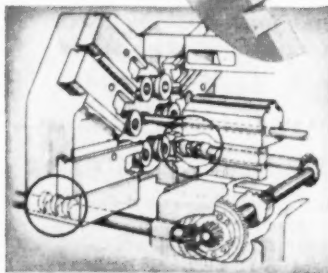
On Greenlee Automatics, cross-slide cams are fully interchangeable—any cam can be used to move any cross-slide. Drive for the cams is arranged in such a way that the cross-slide travel is in a selected ratio to the travel of the main slide. Standard cams are available to provide a wide range of ratios.

In the average job shop, a set of only 15 standard cams will provide enough flexibility to take care of 90% of the jobs that will come through. Standard ratios range from 1 1/2:1 to 8:1.



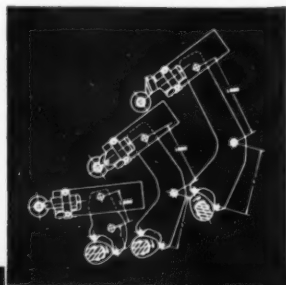
*Simplicity of Design
Promotes Production Efficiency*

The distinctive Greenlee cross-slide cam design and operating features promote production efficiency on many short-run jobs because they reduce changeover time. In addition, there is an economy of investment.



As shown at the left, cross-slide cams are located at the sides of the machine, under the open ends of the cross-slide housing, where they are easily accessible.

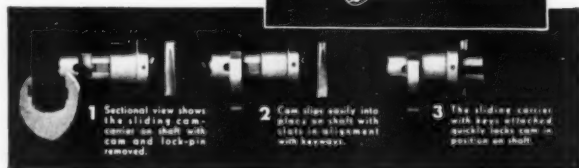
As shown at the right, each cross-slide is operated independently by a separate cam, making it easier to split up operations and arrange better tooling set-ups.



Write for **FREE**
Literature



GREENLEE BROS. & CO.
1834 MASON AVE., ROCKFORD, ILL.



LARGEST SELLING CUTTERS

FOR TOUGH DIE STEELS!



This T-J Cutter at work on a connecting-rod die block for a board drop hammer. A cutter of right design and heat treatment for this high speed work in tough die steels, making possible maximum efficiency of these machines.

Specify **T-J**

FOR MORE WORK BETWEEN GRINDS!

In die and forge shops everywhere . . . T-J Die Sinking Milling Cutters are today's top favorites . . . because they're "tops" in performance!

You can raise the feed . . . they're *extra sturdy* for cutting tough die steels! Designed for speed, accuracy and long life . . . T-J Cutters hold a sharp edge longer on job after job . . . *less breakage!* Made from an extremely high grade steel . . . properly machined . . . scientifically heat-treated and accurately ground. Wide range of styles and sizes . . . *right* to increase the output of your machines and *reduce costs!* Send for new catalog 150. The Tomkins-Johnson Co., Jackson, Mich.

FOR TOUGH JOBS SPECIFY

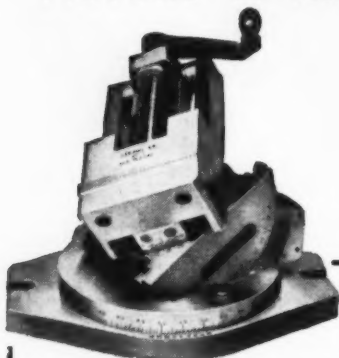


TOMKINS-JOHNSON

DIE SINKING MILLING CUTTERS



PICTURE OF ANGLE JOB SETUP WITHOUT **WESSON** UNIVERSAL VISE



Speedy, precision angle set-ups are simple, fast and economical when you use Wesson's 3-way Universal. Wesson angle vises eliminate many costly special fixtures.

WESSON PRODUCTS CO.
1220 Woodward Hts. Blvd.
Ferndale (Detroit 20), Mich.

Please send me illustrated
bulletin of WESSON Universal
VISES and ANGLE PLATES.

Name and Title

Firm Name

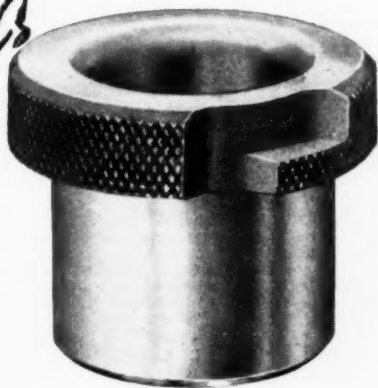
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City

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**AMERICAN'S "KING SIZE"
SELECTION HAS ELIMINATED
50% OF OUR SPECIALS!**



American **DRILL JIG BUSHINGS**

SAVE YOU TIME AND MONEY

50% of your specials are now American's standards. The new standard sizes are listed in our new catalog. In addition, all lengths are now standard with American (no added charges). Our KING SIZE selection of standard types and sizes are immediately available to you through our fully stocked exclusive Distributors — no waiting! SPECIFY AMERICAN.

**GET YOUR
KING SIZE
SELECTION**
Send for American's
**NEW
FREE CATALOG
NOW!**

TRADE MARK



AMERICAN DRILL BUSHING CO.

5107 PACIFIC BLVD.

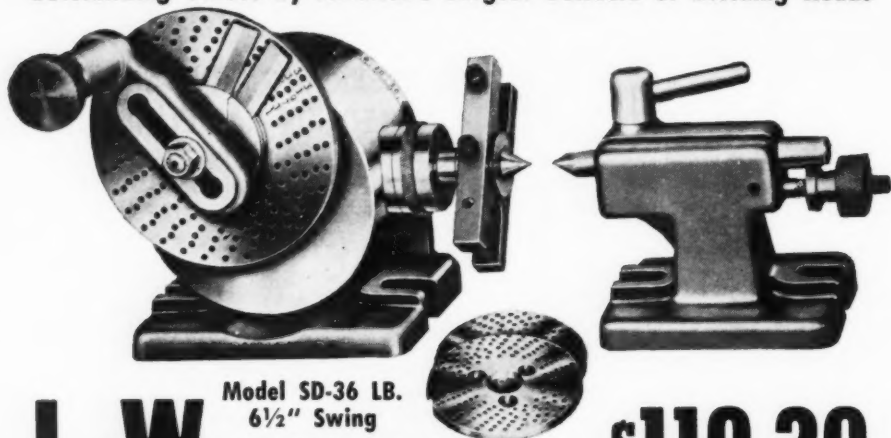
LOS ANGELES 58, CALIFORNIA

SPECIALIZING ONLY IN DRILL JIG BUSHINGS

April, 1953

125

Outstanding Values by America's Largest Builders of Dividing Heads

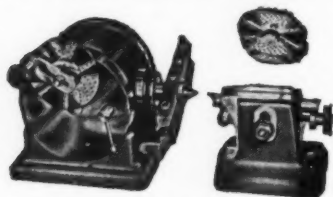


Model SD-36 LB.
6½" Swing
L-W DIVIDING HEAD \$119.30

SPINDLE THREADED 1½"-8 TO FIT L-W 5" UNIVERSAL CHUCK

Heavy duty headstock and tailstock designed for maximum rigidity. Alloy steel threaded headstock spindle with extra large tapered bearing and takeup adjustment collar. Head tilts to 90° in vertical position. Alloy stress-proof steel worm and accurately cut worm wheel cut to close limits for accuracy. Ball bearing thrust and adjustable for end play. Complete with three index plates for dividing all numbers to 50 and even numbers to 100, except 96T. Index chart shows all divisions obtainable to 380. Right or left hand models.

You Can't Beat Them For Accuracy and Ruggedness



Model BP 11" Swing for
 plain milling machines.
 Shipping weight, 140 lbs.
\$199⁵⁴



Model AU 11" Swing. Fully
 Universal for complete in-
 dexing and spiral cutting.
 Shipping weight, 190 lbs.

\$296⁰⁶

*Order from your industrial supply distributor or order direct,
 giving name of your distributor.*

IMMEDIATE DELIVERY

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



DYNAMOMETERS



MAGNETIC CHUCKS



DIVIDING HEADS



RESTIFIERS



REMANETIZING SWITCHES



LATHE CHUCKS



UNIVERSAL CHUCKS



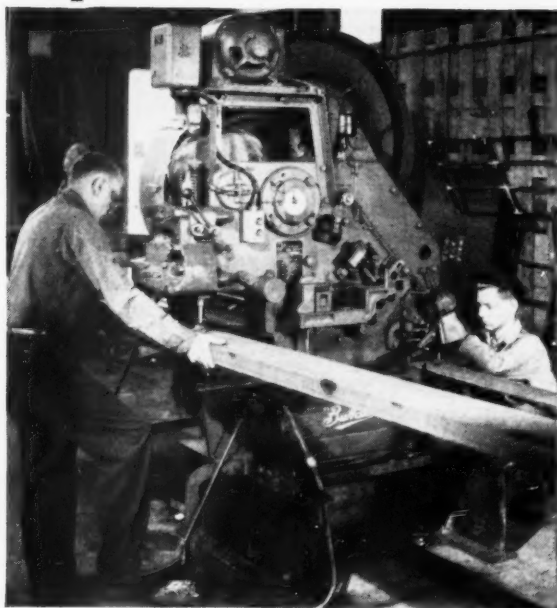
POWER HACK SAWS



MILLING MACHINE VISES

L-W CHUCK COMPANY 23 SO. ST. CLAIR ST. TOLEDO 4, OHIO

You'll Save
TIME • FLOOR SPACE • MONEY



with a
"Buffalo"
**UNIVERSAL
 IRON
 WORKER**

- Cuts
- Punches
- Shears
- Notches
- Copes

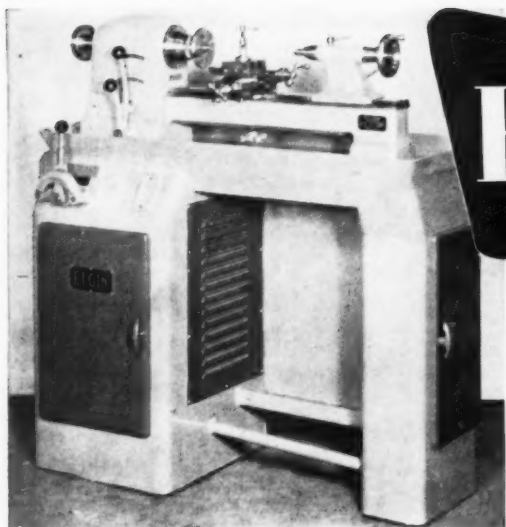
This one rugged, easy-to-operate machine can do up to 5 different fabrication jobs, three at one time! And it takes up the floor space of only one machine, not five. You'll be money ahead — space ahead —

production ahead with your work on angles, tees, flats, channels, rounds and squares — with a "Buffalo" Universal Iron Worker. Write for BULLETIN 360.



"Buffalo" MACHINE TOOLS
BUFFALO FORGE COMPANY
 161 MORTIMER ST. BUFFALO, NEW YORK
 Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING CUTTING BENDING



ELGIN LATHES

MODEL EPL-5C STEEL PEDESTAL BASE

Knee Hole Bench affords operator utmost comfort and convenience directly in front of work. Variable speed drive provides stepless speeds 120 to 3780 R. P. M. Built-in cabinets of ample size for collets and other tools. Collet capacity 1". Nine-inch swing.

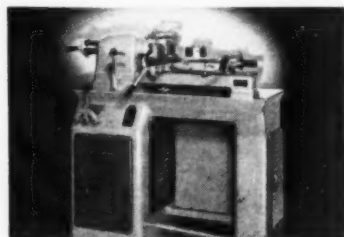
TOOL ROOM PRECISION WITH PRODUCTION SPEED

You can depend on it when you use Elgin Lathes for smaller types of work that must be finished to close tolerances. They are designed and built with sturdiness to insure precision operation at production speeds.

Elgin Lathes are available in a variety of designs for special applications and with different bench types.

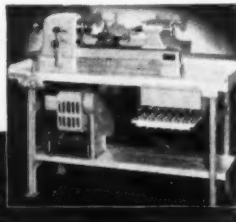
ELGIN LATHE MODEL EL, WITH LAMINATED WOOD BENCH

Designed specially for Tool Room work with extra bench space. Extra strong and rigid. Bench top is 2 1/4" laminated seasoned hard maple and thoroughly re-inforced. Lathe specifications, same as shown above.



HAND SCREW MACHINE

With steel pedestal base. Spindle speeds 120 to 3780 R. P. M. with Variable Speed Drive. Any speed quickly available without stopping spindle. Directly reversible. Collet capacity 1". Nine-inch swing. Two-speed motor, 3/4-3/8 H. P. Coolant system mounted in back and outside for convenience.



ELGIN TOOL WORKS, INC.

1772 BERTEAU AVENUE

CHICAGO 13, ILLINOIS

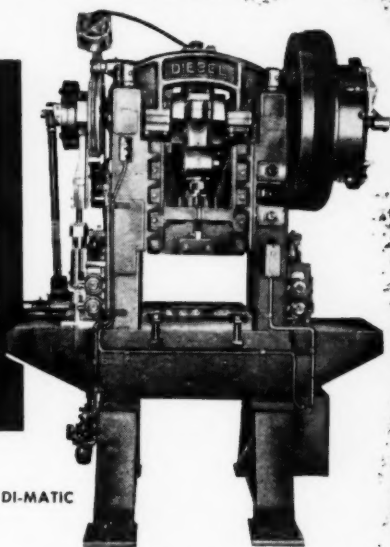
Question

**can you
L-E-N-G-T-H-E-N
your
DIE life?...**

Answer

Definitely yes—if you employ your dies in a press engineered with the dies in mind, a press designed to assure positive punch and die alignment, no press deflections, and negligible vibration and shock.

The life of any die—the quantity of stampings obtainable—is limited by a definite number of sharpenings. Increasing the number of stampings between grinds is the *only* way to lengthen die life.



40-TON DI-MATIC

The Diebel 40-ton DI-MATIC Press prolongs die life because of die conscious press engineering

- Cylindrically Shaped Ram, Precision Ground — guarantees perfect alignment of punch and die
- Crankshaft Supported by Four Bronze Bearings — assures greater press rigidity
- Keyed and Tie-Rod Frame Construction — eliminates press deflections
- Built-in Shock Absorbers — minimize vibration and die shock

also 5-TON

8-TON

12-TON DI-MASTER PRESSES

Investigate

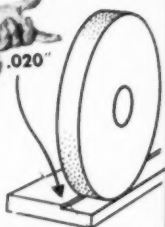
DIEBEL PRECISION-BUILT
AUTOMATIC PRESSES

Write for catalog

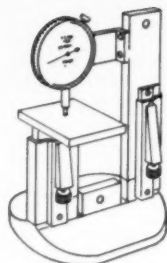
Di Machine Corporation

2712 W. IRVING PARK ROAD
CHICAGO 18, ILLINOIS

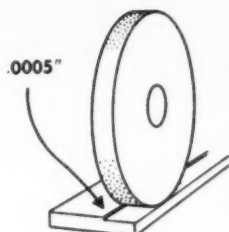
CAN YOUR SURFACE



1. Remove .020" from a 2" x 3" piece of oil hardened tool steel using a .020" automatic crossfeed at each end of the stroke—material to Rockwell 59-60 C scale.



2. Remove the work and measure its thickness. For extreme accuracy use DoALL Gage Blocks with Micro-Step accessories or electric comparator.



3. Put the work back on the machine and zero the elevating hand wheel (slip rings on the DoALL hand wheels make this a quick, easy job.) Now set the hand wheel to .0005" and cut across $\frac{1}{2}$ of the work.

New 1953 DoALL Precision Surface Grinders Establish New Standard of Performance

THE test described above is just one of several that prove the accuracy, rigidity and matchless performance of DoALL Surface Grinders.

There is no give, no wheel ride-up, no play in a DoALL Grinder. Accurate duplication of parts, time savings and elimination of spoiled pieces are the advantage of true precision work. With a DoALL Surface Grinder your operator will not have to remove the work from the chuck and measure it for size. The DoALL Grinder will accurately produce parts to a predetermined tolerance from the hand wheel setting.

Surface grinding is often the *starting point* for accurate work and generally the *finishing point* when close tolerances are required. There is no substitute for perfection in surface grinding—can your grinder pass the DoALL test?

Proof of these claims can be yours without cost or obligation. Simply ask for a free demonstration. Operate a DoALL Surface Grinder in your plant, on your own work, and see how precision grinding will reduce operating costs.

Call your local DoALL Sales-Service Store, or write:

THE DoALL COMPANY, 254 N. Laurel Avenue, Des Plaines, Illinois



BAND MACHINES



MAGNETIC CHUCK

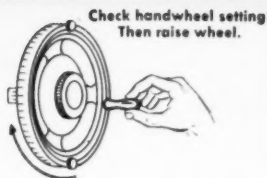


SINE CHUCK

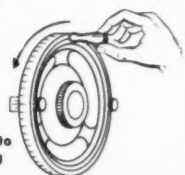


SELECTRON

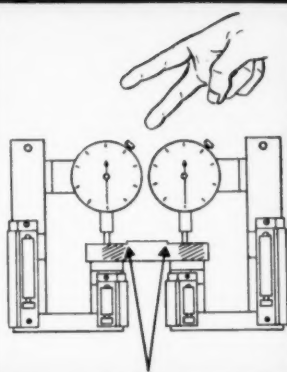
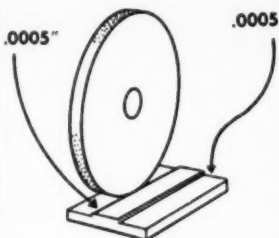
E GRINDERS DO THIS?



Check handwheel setting
Then raise wheel.



Lower wheel to
same setting
as above.



4. Check the hand wheel setting, then raise the grinding wheel. Now move the work piece to the opposite side and lower the grinding wheel to the exact setting of the preceding cut.

5. Now take another cut across $\frac{1}{2}$ of the work on the surface opposite the first cut. The resulting cut should be precisely the same if your grinder is capable of accurate duplication.

6. Prove it! Measure three points in each cut with precision measuring instruments. If you make this test with a DoALL Grinder you'll find the work is perfect — the cuts are exactly the same depth!

New Models... New Sizes DoALL Surface Grinders for TOOLROOM and PRODUCTION Work

D-6 Models—6" x 18" and 6" x 24" sizes. Manual and hydraulic operation. 7" wheels.

D-8 Models—8" x 24" with 10" or 14" wheels. Manual and hydraulic operation.

D-10 Models—10" x 30" with 10" or 14" wheels. 12 1/2" work height capacity, all models.



Model D-10 Grinder with complete automatic, electric remote control system.

NEW Catalog



COOLANTS



GRINDING WHEELS



DIAMOND DRESSER



DUST COLLECTOR



CRUSH ROLLS



GAGE BLOCKS

\$1927.12

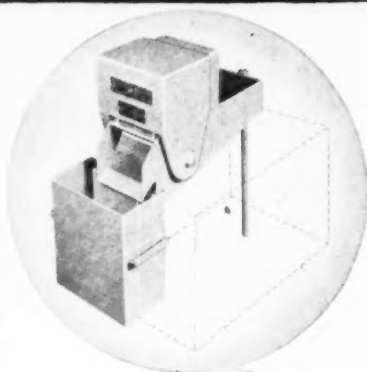
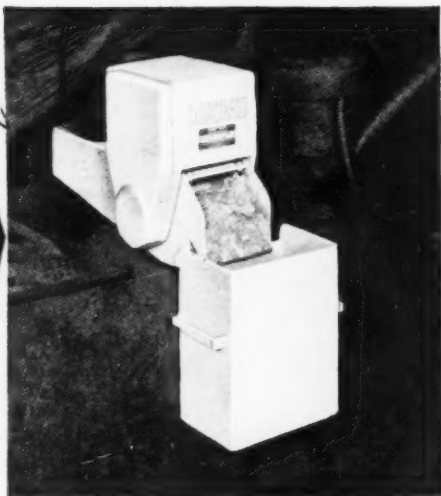
**SAVED
PER YEAR**

...with Sundstrand Magnetic Coolant Separator

Installation of a Sundstrand Magnetic Coolant Separator on a grinder, as shown above, resulted in a yearly saving of \$1927.12. Further, instead of cleaning the coolant tank twice daily, it now requires cleaning only *twice weekly*. Cost of the installation is approximately \$475.00. The unit requires no attention and little or no maintenance.

Easily Installed Without Additional Piping.....

An important feature of this magnetic coolant separator is that it can be dropped into position on most open type coolant tanks. No additional piping is required. Install one on your present equipment and compare its efficient operation with other units.



Free Additional Data

This folder will give you the complete facts on the Sundstrand Magnetic Coolant Separator. Write for your copy today. Ask for bulletin 431.



SUNDSTRAND
Magnetic Products Co.

Division of Sundstrand Machine Tool Co.
1020-9th ST. • ROCKFORD, ILLINOIS

PLYLE NATIONAL INCREASES PRODUCTION 47%!

Soldering Of Spring Assemblies Speeded
By **LINDBERG** Induction Heating Unit



An hourly production increase of 47% . . . and a per-operator production increase of 330% through the use of a Lindberg In-

duction Heating Unit! These are the money saving facts and figures reported by Pyle National Co., Chicago manufacturer of electrical components.

The company uses a 10 KW Lindberg unit for the production soldering of flanges to coil springs in the manufacture of torsion spring assemblies. The time cycle is 11 seconds for each assembly.

Production has been increased to 125 assemblies an hour . . . with one girl operating the equipment. This is an hourly increase of 40 assemblies over the former method where soldering was done by a team of three men using gas torches. And the hourly per-operator production is up from 28 to 125!

With the induction heating unit, there are no open flames from gas torches. No extra exhaust fans are required . . . there is little danger of burns to operators . . . fire hazards are virtually eliminated!

And there is a substantial economy of floor space! Formerly the three torch operators required more than 60 square feet of floor space . . . but the Lindberg Induction Heating Unit requires less than 30 square feet.

If your requirements call for production soldering, brazing, hardening, annealing, stress relieving, hot forming, forging or shrink fitting, investigate Lindberg Induction Heating Units. Ask for Bulletin 1440.



These parts . . .

plus this ring of soft solder . . .

go through the

Lindberg Induction Heating Unit

to make this

torsion spring assembly . . .



LINDBERG



HIGH FREQUENCY DIVISION

LINDBERG ENGINEERING COMPANY,
2450 West Hubbard Street, Chicago 12, Illinois

Put ***HIGH-SPEED*** into your production

These four High Speed machines are helping speed production and decrease assembly costs in many industries.

COLD RIVETER

Break those riveting bottlenecks—reduce assembly costs—put **HIGH SPEED COLD RIVETERS** in your production line. Made in 10 sizes to cold head rivets from 1/64" to 2" in diameter. Versatile—they can perform 16 other metal working operations.

Free Engineering Service: Send us samples of your riveting work for assembly and recommendations—no obligation.

STAKING MACHINE

Staking Machines available in four foot and two air-operated models. Will handle over 1000 pieces per hour. Our engineers, specialists in staking and riveting, have studied and solved hundreds of assembly problems, in staking or riveting fixed or movable joints—eyeletting, grommeting, burring, pointing with platinum, tungsten, silver. (Send us samples for recommendations and quotations—no obligation.)

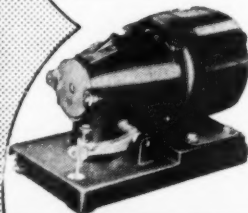
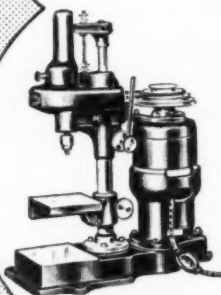
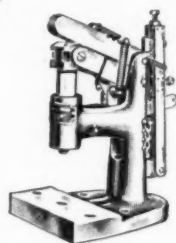
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Featured IN THIS ISSUE

| | |
|--|------------|
| Skillful Design of Triple and Double Leaf Drill Jigs | 155 |
| The Right Rivet For the Right Job Can Save You Time and Money | 162 |
| Get More Production, Finer Finishes From Your Reamers | 174 |

Skillful Design of Triple and Double Leaf Drill Jigs Increases Production and Accuracy, by Joseph Ziegler. The Ampro Corp. had a problem of drilling many small holes with a close center distance. Conventional methods of performing the operation were time consuming. How the company solved its problem through ingenious jig design is the basis of this article. Mr. Ziegler is one of the better tool engineers in the Chicago area. Page155

The Right Rivet for the Right Job Can Save You Time and Money, by Robert M. Gordon. This is the first of two parts on the use and selection of rivets. In this part the various types of rivets and the riveting machines are discussed. In the second part of this series specific applications will be analyzed. Page162

Get More Production . . . Finer Finishes From Your Reamers, by F. R. Sund. Reamers are not reamers; much depends on how they are used. Many variables affect their efficient use. By selecting reamers intelligently and using them properly a finer finish will be imparted to the work, to say nothing of the increased production which may be gained. Mr. Sund, who is a reamer engineer with Barber-Colman, gives some worthwhile tips in this article. Page174

Automatic Cam Milling Fixture, by Tom Brown. The problem concerned the manufacturing of small cams not exceeding 1 1/2" maximum radius. With the object of performing quick changes from one cam shape to another, this cam milling fixture was designed. Page185

Hundreds of Small Holes Drilled Economically in Stainless Steel Jet Rings, by Arthur A. Merry. While this machine is concerned

with the machining of jet rings the idea can be utilized on any operation involving the same basic problem, which is to drill hundreds of small holes in a large circular part. Page195

An Interesting Boring Fixture, by Robert Mawson. This is one of the last articles written by Mr. Mawson shortly before his death last year. It is in the same vein as others which have appeared in this publication over the last few years. Page201

BLUE BOOK'S "Know-How" REFERENCE SHEETS. In keeping with the special report on grinding machines this month's sheets are concerned with Grinding Wheel Speeds. Page223

Tool Crib Control is More Than an In-Out Record, by Paul T. Sherwood. A simplified posting, a system of colored signals and an arrangement of cards, pockets and trays give this company an accurate, inexpensive and always-current tool crib control. Page230

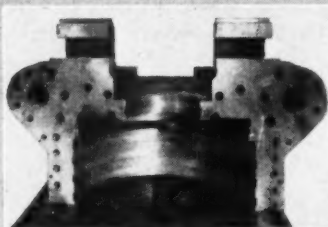
Help Your Shop "Romeo" Grow Up, by Edmund Mottershead, cartoons by Glueckstein. Every shop has the problem of the worker who fancies himself a ladies' man. His presence usually leads to trouble. How he can be handled is discussed by Mr. Mottershead in this month's Foremanship Forum. Page237

Special Report on Grinding Machines. This is report No. 28 on Grinding machines, part 2. Last month the article dealt with Grinding Single Point Tools; this month the emphasis is on Grinding Multitooth Cutters. Also in the special report are a description of late model tool and cutter grinders, specifications of American built machines. Page247

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Here 3" pipe tap holes are being drilled and threaded in 3000KW Turbine Generator End Casting.

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AS THE *Editor* SEES IT

Depreciation Reform

A possibility exists that this country may catch up with the rest of the world in the foreseeable future on the matter of depreciation. Having been behind the times since 1934, to the detriment of modernization and efficiency, there is an encouraging breeze of activity among our lawmakers to amend existing laws governing depreciation.

As the law stands now, equipment and plants are written off over a fixed period, ranging anywhere from 3 to 65 years—the fixed period having been determined by the Bureau of Internal Revenue.

This entire business is neither intelligent nor helpful, stemming back to the days of 1934 when a lot of little professors used big wrenches to monkey with the machinery. (It must be granted some of the machinery needed a bit of tightening here and there, but depreciation policy wasn't one of them.)

The user should determine the useful life of the equipment, industry contends; under present rules business cannot recover cost of equipment when it's still new and highly productive. Change the depreciation laws and more equipment will be purchased because users can write obsolete equipment off the

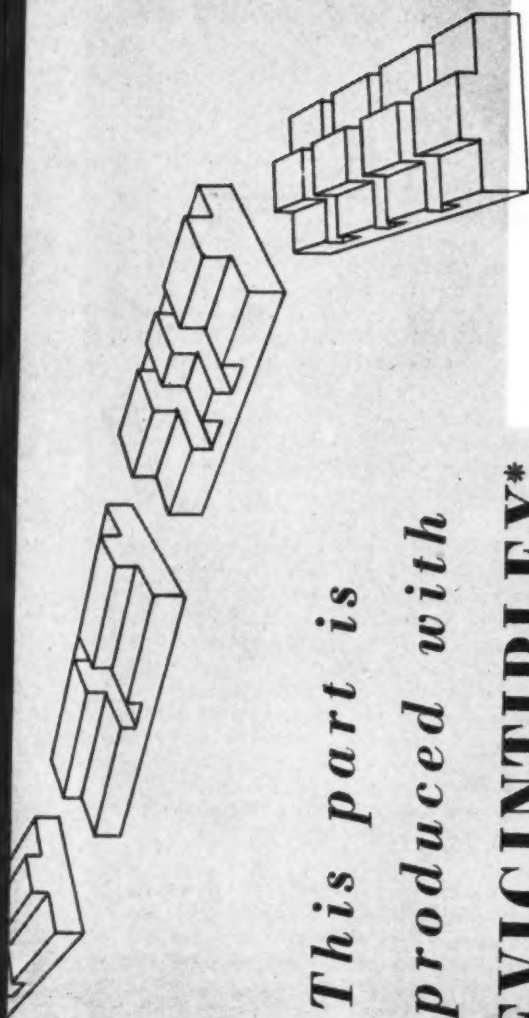
books. The Machinery and Allied Products Institute suggests: (1) Let business determine useful life of the equipment; (2) write off the cost of equipment over two-thirds of service life; (3) place the burden of proof on the Internal Revenue Department that depreciation deductions are out of line.

Senator Frear has introduced a bill under which business will set the useful life of the equipment, within certain limitations.

The matter having been introduced in Congress does not mean there should be riotous and joyous dancing in the streets. Some lawmakers are lukewarm to any idea with the appearance of depriving the government of revenue. Some members of Congress still think of business as the great big wolf; however, all indications are that something might get under way by 1954. Sources close to Congress say depreciation laws will be changed quickly at the first sign of a business downturn.

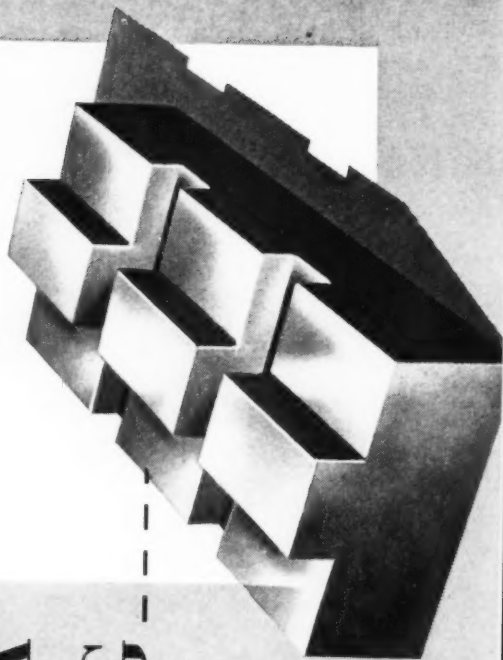
This brings to light some interesting economic thinking: if the present depreciation laws were enacted as helpful legislation during the depression, why is a downtrend in business required to wipe them out?

William F. Schleicher



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A metal parts manufacturer recently asked Detroit Broach for broach tooling which could produce 19 different sizes of a similar part. Because production of each size was low, it was essential that a universal tooling set-up be created to realize the full economies of broaching.

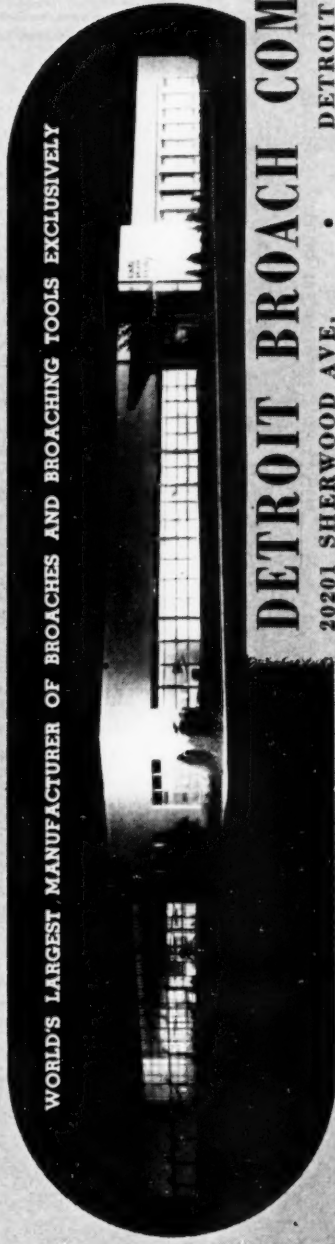
The problem involved the broaching of a tongue and one, two or three cross slots in the metal parts which varied in width and length.

Detroit Broach engineers tackled the problem and came up with undevigintiplex tooling. Two stations were provided on a 25-ton single ram vertical broaching machine to broach the tongue and the cross slots. To take up for the

variation in the cross slots of the 19 different sized parts, spacers were used between the broaches. And for the differences in width and length of the parts, inserts were used in the workholding fixture. Result . . . 19 different sized parts produced in a single tooling set-up!

This is just typical of the economies that can be had through universal broach tooling when a number of similar low production parts are needed by manufacturers. You, too, may have an application that can be materially reduced in time or cost by the economy of broaching. It will pay you to consult Detroit Broach for engineering or production data.

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LAST MINUTE WASHINGTON NEWS



by Arnold Kruckman

Washington Correspondent



One of the good things the Truman Administration left for this Administration is the Vance Report. As a document, it is crisp, clear, terse and makes a very useful proposition. This Administration and Congress, in due time, will make the ideas effective. If you want a copy of the report send to the Executive Office of the President, Office of Defense Mobilization in Washington and ask for the report of the Advisory Committee on Production Equipment entitled, "Production

Capacity—A Military Reserve."

The report begins by launching the proposal that it be the policy of the Government, in preparing for a mobilization period, to substitute, to the greatest extent practicable, production capacity in place of the stockpiling of military end-items.

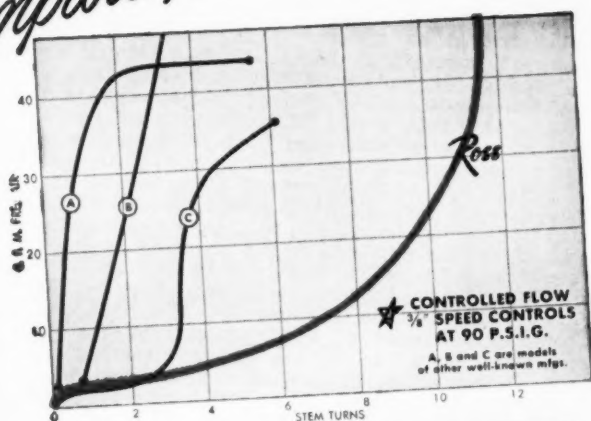
It recommends that the Department of Defense be required immediately to redouble its efforts to complete a statement of phased mobilization end-item requirements that is within the range of the known resources of the country, and thereafter continually review and revise these requirements as necessary. Also, that the additional production facilities needed to carry out the proposed policy be created without delay. And that production facilities for mobilization be maintained in an up-to-date condition ready for rapid activation in case of emergency.

The report urges that where deficiencies exist in capacity to produce heavy production equipment, the Government take every means at its disposal to stimulate creation of the needed capacity by private industry, and if these efforts fail because the capacity needed is found to be commercially nonsupportable, the Government itself create and maintain this capacity.

It suggests that the Department of Defense set up specific procedures, and other executive agencies take whatever action is necessary, to comply with this policy. Congress is requested to take whatever action is needed to confirm and support this policy.

The committee noted the basic problem it studied was that of determining the best method of filling the gap between existing production capacities and those which would be needed

Compare ★



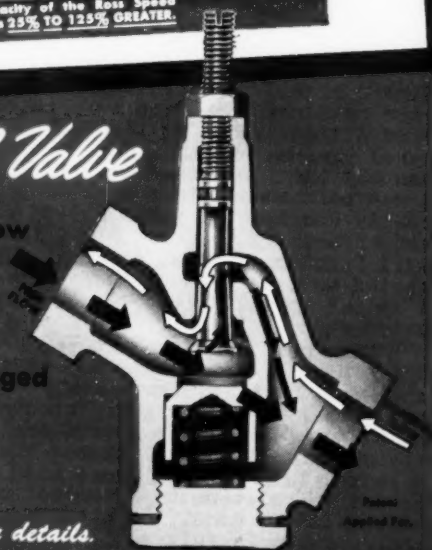
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to meet end-item requirements in the event of full mobilization. The report repeatedly insists, with forces-in-being and weapons production now having been brought up to substantial levels, the emphasis should be shifted to completing the production capacity needed as a base for full mobilization. It emphasizes such a shift is necessary because the outbreak of a new war probably will not allow the nation the necessary period of time—such as it enjoyed in the First and Second World Wars—to expand its production equipment industry and tool up its military production plants. The committee emphasized that "capacity to produce is, in fact, a military reserve of the highest order. Maximum capacity can be achieved with maximum economy by maintaining munitions production plants in a high degree of readiness, capable of rapid expansion of output in event of war, and relying upon such readiness as a partial substitute for stockpiling of reserves and munitions to attain military preparedness with maximum economy and a minimum drain on resources, the initial cost of facilities is small compared to the cost of producing end-items for the mobilization reserve. For example, in the case of certain ammunition components, the cost of facilities is equivalent to the cost of full production for only about six weeks. Moreover, most facilities are not subject to 100% obsolescence at any time, as are end-items, and the cost of modernizing facilities to produce improved end-items is only a fraction of the expense of modernizing stockpiling of end-items by scrapping and replacing obsolete models. In many cases the recovery and reuse of materials from obsolete end-items is more costly than the original cost of the material."

The committee pointed out that the loss of military usefulness of end-items through obsolescence is of primary concern since reliance upon such weapons could very well spell defeat in an all out war. On the subject of cost, the committee declared that end-items are more seriously affected by obsolescence than are the facilities that produce them. As an illustration, it was pointed out that when an inventory of 5000 tanks becomes totally obsolete it means a loss of at least \$1 billion, but the cost of keeping the tank plant facilities up to date would be a small fraction of that amount. "The reserve production capacity created must be kept up to date and in ready working order. If it is not so maintained the measure of security sought would be lost."

The committee stresses the proposed policy has been accepted in principle, but insists that a number of concrete measures must be taken immediately to carry it out. Both civilian and military agencies must immediately calculate and keep up to date estimates of phased mobilization requirements that are within national capabilities. The question of how much capacity is needed to provide a sound base for mobilization can only be decided in relation to a realistic evaluation of military requirements—the guns, the aircraft, the ammunition, and other hard goods—for a full mobilization.

"In general, the statements of requirements for full mobilization currently being used as the goal for military production planning, both production capacity and end-item reserves, are not within national capabilities. In fact, they call for greater quantities in military hard goods than the supplies of materials, and the manpower and production capacity of the

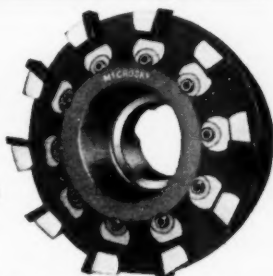
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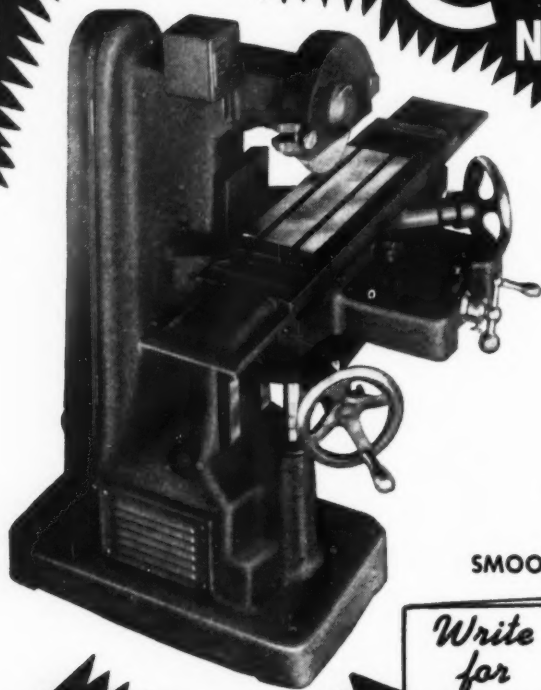
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nation could possibly support. Once the phased end-items requirements for mobilization has been established, the required production capacity should be created, particularly because of its economy aspect, at the fastest practicable rate. About \$500 million expended for long lead-time items of production equipment in the Air Force Production Acceleration Insurance Program would increase the mobilization capacity for the production of aircraft by about \$18 billion during the first two years alone, if the production equipment is actually acquired prior to the mobilization period. Thus the increased production capability would substantially reduce the mobilization reserves that would otherwise have to be accumulated, and the savings in the required outlay of funds prior to a mobilization is in the ratio of 36 to 1. As another example, there is a gap in one ordinance item of about 50% between stated requirements and production capabilities in the first three years of mobilization. An expenditure equal to the cost of only 150 of this item in a program calling for eventual production of thousands would provide the long lead-time and hard-to-produce production equipment capable of meeting maximum rates in advance of a mobilization period."

Harold S. Vance is chairman of the ODM Advisory Committee on Production Equipment. Mr. Vance is chairman of the board and president of the Studebaker Corporation. Other members of the Committee are: Clay P. Bedford, president, Chase Aircraft Company, Inc.; Admiral W. H. P. Blandy, USN (ret.), president, Health Information Foundation; Manly Fleischmann, former Defense Production Administrator; Lt. Gen. LeRoy Lutes, USA (ret.), president, Pacific Tire and Rubber Company; Rear Admiral Lewis L. Strauss, USNR, consultant and financial advisor to the Messrs. Rockefeller, and former member of the Atomic Energy Commission; and Lt. Gen. K. B. Wolfe, USAF (ret.), president, Oerlikon Tool and Arms Corp. of America, and former Chief of Air Force Procurement.

* * *

As forecast in these letters, the new Administration and the new Congress are still going through the process of shaking down. It is a difficult job to make the shift after twenty years. What you read in the newspapers that seems to be positive, generally is the father to the wish. The greatest difficulty is the attempted shift in personnel. For instance, Attorney General Brownell discovered that of the 1100 lawyers in the Department of Justice he can replace only twenty or twenty-five with persons of his own choosing. Mrs. Hobby, in her Federal Security Administration, has between 37,000 and 40,000 employees. She was shocked to find that she can replace, at the outside, only six. While these instances are extreme they are typical of the situations which all the new heads of departments, and other agencies, find when they wish to infuse their organization with new energy and new blood. Obviously, the condition not only makes difficult the plans and programs the new people have in mind, but it increases the paralysis in the operation of the Government, for the time being. There is a growing sense of frustration among the new administrative officials. They have discovered that Civil service can be an evil as well as a virtue. In order to get somewhere with the problem they have turned to Congress, and have asked Congress if it can

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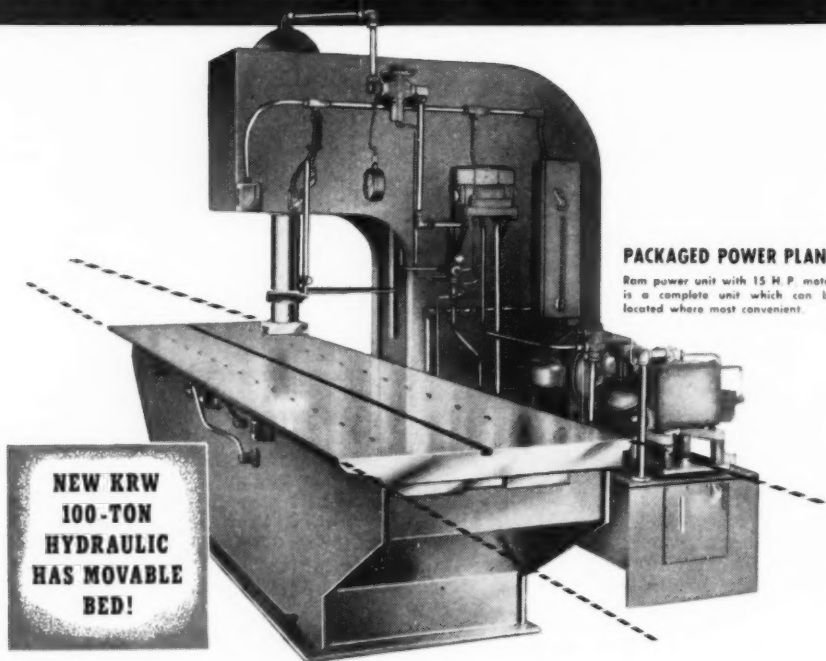
amend the Civil Service law so they may have more freedom of initiative in readjusting their personnel. At the present time the only thing they can do is to shift an unwanted employee from one job to another in the hope that he will quit, or ask for a transfer to some other agency. Unless there is a real cause, a Civil Service employee cannot be discharged or cannot lose his rating and the level of his salary. It is probable the Civil Service law will be amended so that a substantial number of jobs can be abolished. Naturally, any legislation for this purpose will be extremely unpopular with the 2,600,000 individuals now on the payrolls under Civil Service status. They can do much political harm to the Congressman who has the courage to sponsor the legislation. However, men like Major General Wint Smith, who represents the cattle country of Western Kansas in Congress, have the courage to propose the amendment. Wint Smith was a point commander in General Patton's tank corps during its famous dash through Europe. He was probably the most noted of the flank Commanders. Also, he has had an extraordinary record as a peace officer in the wild section of Oklahoma.

* * *

There has been a great deal of discussion about what shall be done about taxes; but nothing really can be done until Chairman Daniel A. Reed of the Ways and Means Committee of the House, and the President get together on a program. Reed insists that there must be a cut of not less than 5½% in the personal income tax. If he could have his way he would make the cut as high as 10%. Also, he will fight with every resource at his command to have the excess profits tax lapse, under the present law, on June 30. The desire to cut the excess profits tax is strong in both parties. The demand cuts across party lines. There is a strong feeling that despite the fact that it has brought from \$1 billion to \$2.5 billion into the Treasury it has not helped the economy in any way. Representative Reed insists that any easing of corporate or business taxes must be met by cuts in individual taxes. He also says that it should be easy to bring the Budget down to somewhere between \$68 billion and \$69 billion, in which case there is no need for more taxes. Senator Frank Carlson, of Kansas, can demonstrate convincingly that the Truman Budget of \$78 billion can be brought down to \$66.100 billion for fiscal 1953-54.

If the Administration and the Congress doesn't interfere it is estimated something like \$8 billion will automatically be cut out of the tax gouge between July 1, 1953, and April 1, 1954. It is estimated the expiration of the excess profits tax will save the taxpayers at least \$2 billion in fiscal 1954. The law requires that individual income taxes return to the rates prevailing before the Revenue Act of 1951, on January 1, 1954. This means a reduction of approximately 10%, saving the taxpayers between \$1.100 billion and \$2.500 billion in fiscal 1954 and fiscal 1955. Corporate income taxes return to pre-1951 levels on April 1, 1954. On this date the present 30% normal tax rate on corporate income in excess of \$25,000 will be reduced to 25%, saving the taxpayers \$2 billion in fiscal 1955. If the excise taxes on alcoholic beverages, automobiles, cigarettes, gasoline and sporting goods return to pre-1951 levels it will save the taxpayers \$1.500 billion in fiscal 1955.

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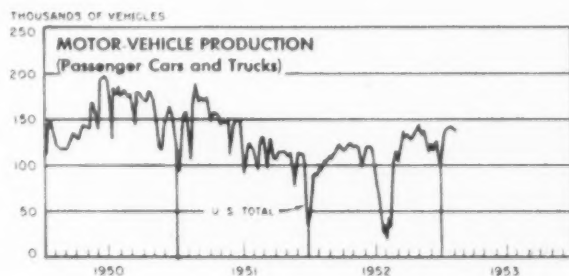
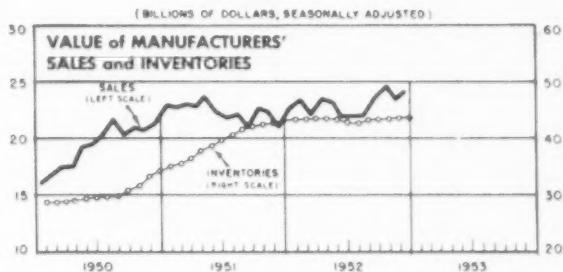
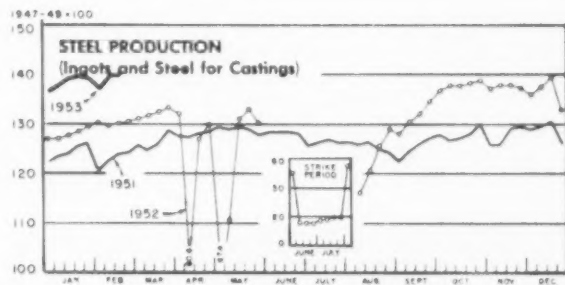
Business Good

All Government Agencies, such as the Federal Reserve Bank, the RFC, and others, continue to report that current business is operating at peak and that they see no break of any kind ahead. January is expected to set a record in peacetime production. The word is that business will go along on this plateau for some time. But frequently industrialists who come to Washington express the fear that the industrial machine of the nation has a capacity far beyond the absorbing power of the consumers and industry itself. Census reports that we will have the smallest birth rate on record during the next five years. However, thereafter it is expected there will be such a tremendous population growth that by 1980 many of the so-called waste spaces of our country will be covered with a teeming population.

At the present time the Department of Commerce reports that there is a high ratio of unfilled orders in all segments of industry. It points out that the suburban areas of our cities in the last ten years have increased in population by over 35%. Motels are increasing far more than other hostleries. Commerce says that the present motel owners plan to build, during the next twelve months, 38,2% more of these caravansaries.

General Business Indicators

source: Dept. of Commerce



PANTOGRAPHY

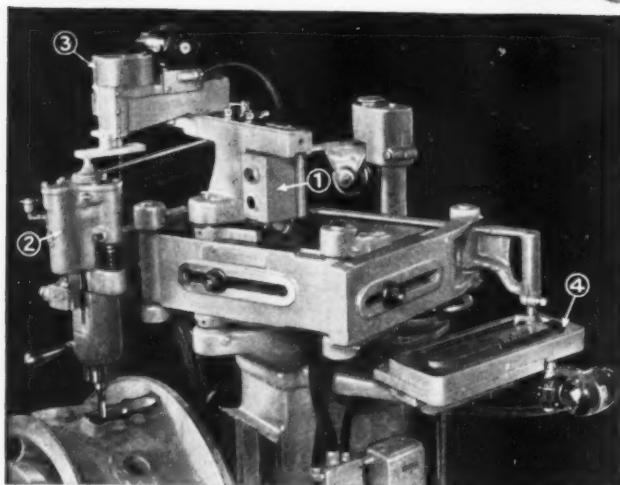
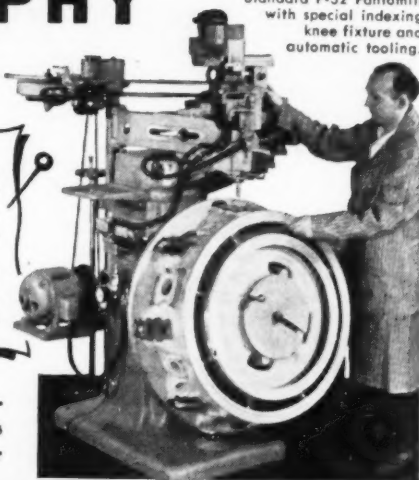
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More About Vance Report

(See Washington Letter this issue)

The report points out that it is cheaper to have standby productive facilities than to load warehouses with tanks, guns, and other military end needs. If a number of tanks which had been stockpiled were to become obsolete the cost to replace them could well run into the billions, whereas standby facilities could accommodate changes in design at a fraction of the cost.

The Truman budget contains provisions for the beginning of some sort of standby program. The budget allocated \$500 million as a starter.

The \$2 billion required to put the Vance report into operation would be split among plants and original equipment. It is estimated that machine tools would account for part of the annual upkeep cost of the facilities. Of the \$500 million, machine tool replacements would account for approximately \$300, with \$200 being split among suppliers of allied industrial equipment.

Military Contracts

Military contracts valued at approximately \$311,000,000 have been earmarked exclusively for small business, and approximately \$79,000,000 in military contracts have already been awarded to small firms under the joint determination program, the Small Defense Administration revealed.

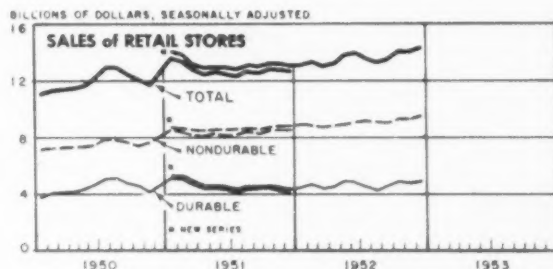
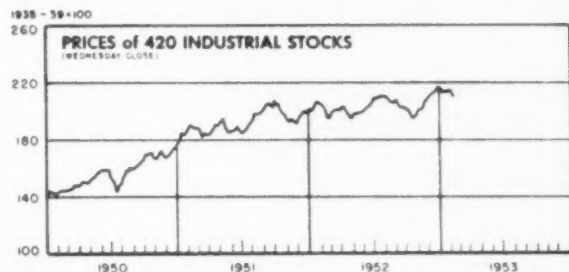
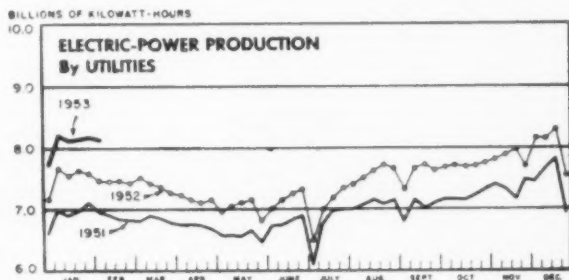
The amount earmarked for small business represents an increase of more than \$60,000,000 in the past three weeks.

Also from the SDPA comes an announcement that it had set a ceiling of \$300,000 on individual loans to small business. Loans or portions of loans for working capital to enable

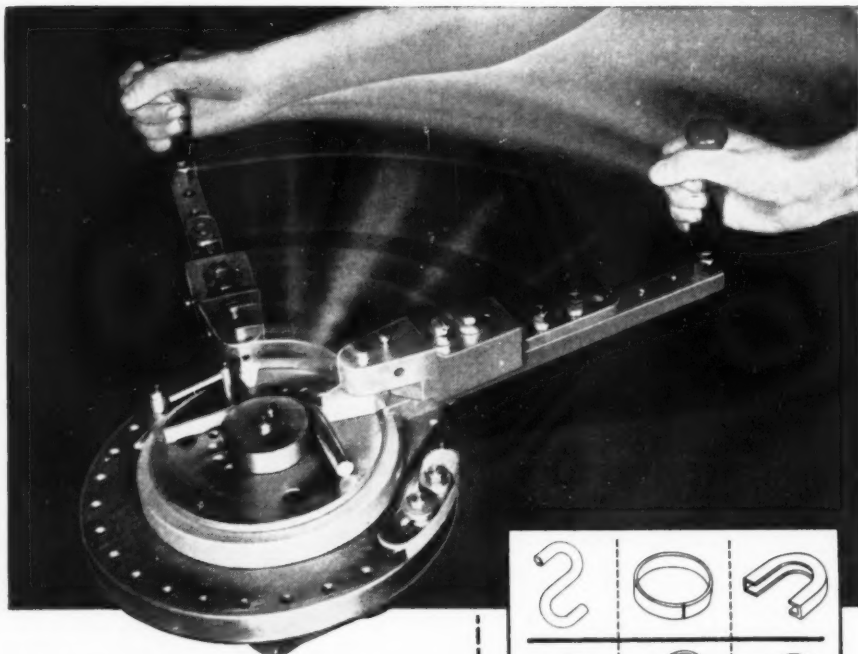
small firms to produce under specific defense contracts are not affected by the order.

A booklet, Small Business Production Pools for Defense, issued by the SDPA, explains that the small manufacturer is frequently at a serious disadvantage in competing for defense contracts because his productive facilities are limited.

The booklet gives basic information about small business production pools and explains in detail the laws which affect their



operations, the necessary procedure for obtaining Government approval of a pool,



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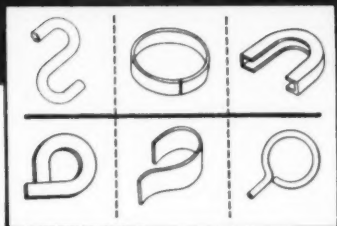
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Index of new orders and shipments of machine tools

source: National Machine Tool Builders Association

| Month | Domestic | Foreign | Shipments | Ratio Unfilled Orders to Demonstrated Production Rate |
|-----------|----------|---------|-----------|--|
| January | 347.8 | 33.6 | 266.6 | 18.1 - 1 |
| February | 318.8 | 14.4 | 279.6 | 17.1 - 1 |
| March | 324.3 | 23.3 | 299.5 | 15.7 - 1 |
| April | 293.5 | 15.6 | 307.9 | 14.8 - 1 |
| May | 284.6 | 31.4 | 323.0 | 13.6 - 1 |
| June | 342.9 | 20.3 | 330.8 | 12.6 - 1 |
| July | 374.6 | 14.9 | 257.2 | 12.6 - 1 |
| August | 309.1 | 22.7 | 314.8 | 12.4 - 1 |
| September | 302.4 | 23.1 | 368.6 | 11.8 - 1 |
| October | 243.3 | 22.5 | 338.2 | 11.1 - 1 |
| December | 225.2 | 19.6 | 355.0 | 9.8 - 1 |
| January | p. 254.9 | p. 26.1 | p. 361.9 | p. 9.4 - 1 |

and the services which SDPA extends to a pool during and after its organization.

SDPA Life Extended

The Senate Small Business Committee recently voted to extend the life of the SDPA. The SDPA was able to point out the success of many of its efforts to help small business in the matter of materials, prices, contracts, government procurement, etc.

There is some sentiment in Congress that the SDPA take over the making of loans to business if the RFC is discontinued next year. There is a strong possibility that the RFC may not continue through next year.

Heavy Activity in Autos

The automotive industry is planning to build in excess of 3 million passenger cars during the first six months of 1953. However, much is dependent on the supply picture, notably steel. They are well on the way to producing 1½ million passenger cars and 340,000 trucks during the first quarter.

At present, the materials shortage is tight; deliveries are close, a situation which could become worse as time goes on.

Another problem, which is certain to get worse in the months ahead, is the manpower situation. Production plans call for considerable overtime work. Many workers are loathe to accept overtime assignments. To carry out present plans the industry may go on a six-day week for

the months ahead, provided it can get the necessary materials to warrant this extension of the work week.

Living Costs Drop

The Bureau of Labor Statistics' new Consumer Price Index, issued for the first time, stood at 113.9 for January as against 114.1 in December. There is a possibility that this decline may herald minor wage reductions in some of the industries where wages are tied to the cost of living index.

Business Good Through June

The latest monthly report of the Business Survey Committee of the National Association of Purchasing Agents sees business leveling off at the present high rate through June. Very cautious buying and inventory policies in force are not a reflection of a pessimistic attitude toward business this year.

Purchasing looks to mid-year as the "period of decision." Twenty percent of the purchasing agents expect continued high activity through the third quarter while another 20 per cent see business holding its present high levels during the balance of the year.

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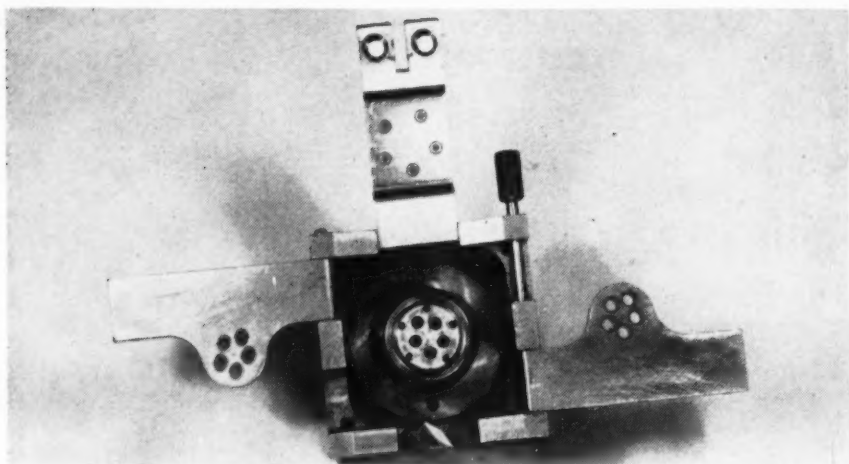
Skillful Design of Triple and Double Leaf Drill Jigs Increases Production and Accuracy

ONE TROUBLE, which is frequently encountered in manufacturing, is the close center distance which must often be maintained between holes which are to be drilled and reamed, or drilled, redrilled and counterbored. When such a situation occurs drilling costs go up due to the cost of the drill jigs and the cost of actual operation. Here, at the Ampro Corp., where we manufacture precision photographic and motion picture equipment, the majority of our parts are small and drilling is all too frequently concerned with the troublesome matter of close center distance holes.

Slip bushings cannot be used in the drill jigs because there is insufficient space between the holes. Relocating the workpiece in another drill jig is extremely costly; and yet, this is exactly how it is frequently done in many industries. Using only one size of bushing has its problems. For instance, you're drilling and reaming five .1875"

by **Joseph Ziegler,**
Chief Tool Engineer
Ampro Corporation
Chicago, Illinois

(+.0005", -.0000") dia. holes. On close center distances you would use a .188" I.D. bushing with a .1875" spotting drill, following this with an 11/64" (.171") drill and drilling through, subsequently reaming through with a .1879" reamer. When this procedure is followed the 11/64" drill is not guided except for the spot made with the spotting drill, consequently it may run off from its theoretical centerline during the drilling operation. Even if the drilling operation is followed by the reaming operation



1. No. 1 jig. This triple leaf drill jig was designed to drill and ream closely spaced holes. The top leaf flops down and is secured by the nut shown at the bottom of the photo. The right leaf flops over and is secured by a pin which can be seen sticking in the jig at the right of photo. The pin is moved around for left or right leaf. The part is shown inserted in the jig. It is secured by a special holding nut.

the hole will not be straightened out if it was originally drilled off.

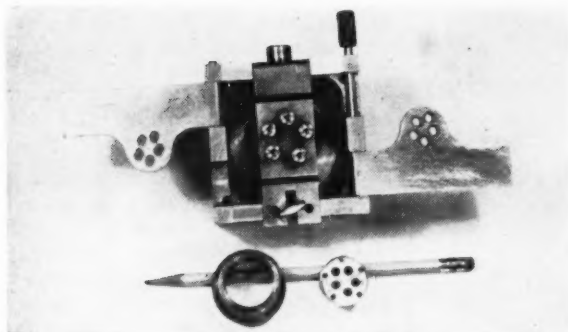
Because of the problems encountered in our manufacturing operations which demand close center distance holes we developed a series of drill jigs which really solved our problem; not only that, but increased our production over previous methods and gave us an accuracy which surpassed the specifications. We designed a number of double and triple leaf drill jigs. The idea can be adapted to any number of drilling, reaming and counterboring operations where holes are closely set together.

The triple leaf drill jig is shown in figure 1. Let us call this No. 1 drill jig to differentiate from others which will be described. The jig is made in the style of a box jig (four sides and a base) since the piece part is rather small. The jig was machined out of a solid piece of cold rolled steel, $3\frac{3}{8}$ "x

$3\frac{3}{8}$ "x2" high. By machining it out of a solid piece we eliminated screws and the need for doweling three hinge supports for the leaves. The leaves are accurately fitted. The positions of drill and reamer bushings are jig bored to \pm or $-.0001$ ".

The piece part is located on and against a 1.000" ($+.0005$ " $-.000$ ") locating stud which has been hardened and ground to close dimensions. Thus the piece part is located in an accurate manner and with a minimum of wear. The part is held with a special nut which secures the piece part parallel to the surface of the locating plug and which also protects the part from side motion during the drilling operation. In figure 1 the part is shown being held in place by the nut. This holding nut, as well as the piece part, are seen separately in figures 2, 3 and 4.

There are three leaves to the jig. The two side leaves are locked in position

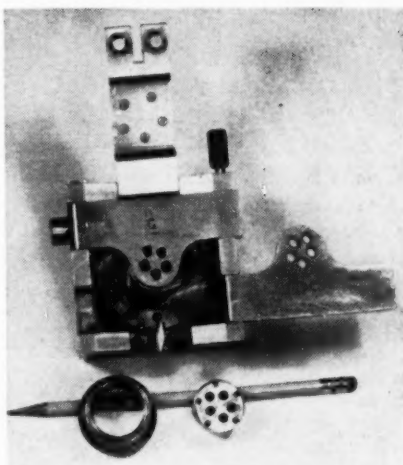


2. No. 1 jig. The top leaf has been flopped over and is held securely by the nut. The part and the holding nut to hold the part in the jig are lying in the foreground on the pencil. This leaf permits the drilling of five No. 46 (.081") dia. holes.

by means of a pin, the top leaf, folding down, is locked by a clamping nut, also clearly discernable on the bottom of the drill jig in figure 1.

The piece part is $1\frac{1}{8}$ " dia. x $\frac{5}{8}$ " high, with a 1.000" (+.0005" -.000") dia. counterbore x .200" deep. Operations are: drill five No. 46 (.0812) dia. holes through and $\frac{1}{8}$ " dia. x $\frac{3}{32}$ " counter-bored; drill five $11/64$ " (.171") dia. holes through and ream to .1875" (+.0005" -.000").

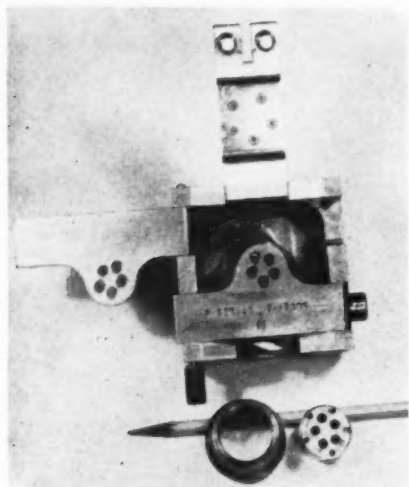
The leaf with five No. 46 bushings is closed and the clamping nut, which aligns and locks the leaf in place, is screwed tight. The leaf is now parallel with the piece part, and the drill bushings are at right angles to the piece part bottom face, figure 2. We are now ready to drill the five No. 46 (.081") dia. holes through the part. After the drilling operation the leaf is opened to rest on the back stop, the latter can be seen at the top of the drill jig and in the middle of the jig. Opening the leaf enables us to counterbore five holes with $\frac{1}{8}$ " counterbores to a depth of $3/32$ ".



3. No. 1 jig. The left leaf has been flopped over for drilling five $11/64$ " dia. holes. The pin is shown inserted, holding the leaf securely in place.

We are now ready to drill the next five holes. The left leaf with five $11/64$ " dia. drill bushings is flopped over and the pin inserted, holding the leaf in place, figure 3. Five $11/64$ " (.171") dia. holes are drilled through. The pin is extracted and leaf is opened.

Next the left leaf, with .1875" dia. bushings, is placed correctly over the part. The pin is inserted and the piece



4. No. 1 jig. The right, and last, leaf is in position for final reaming operation. Pin has been moved from the right side and is now on the left.

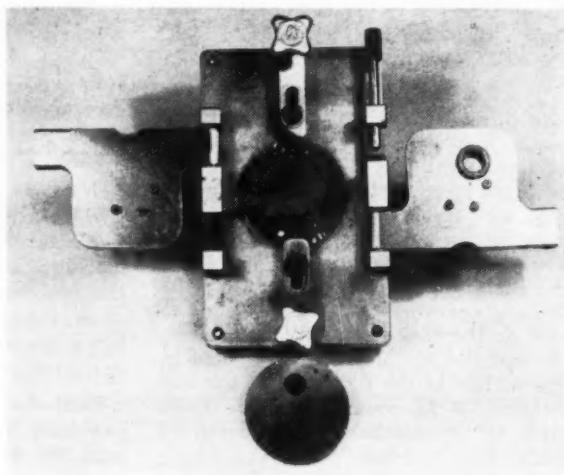
part is reamed to $.1875'' (+.0005'' - .0000''$ dia., figure 4.

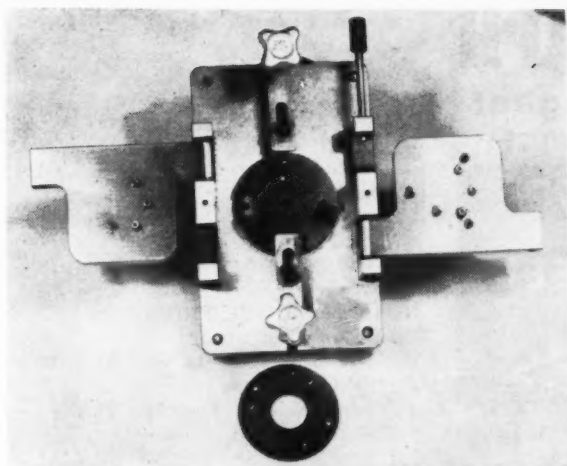
Drilling and reaming of this part met with all the required specifications; in fact, we came closer than required.

In addition to the No. 1 drill jig just described, we made four two-leaf drill jigs to drill **three discs**, $\frac{1}{8}''$ thick x $2-7/16''$ dia., ground to a flatness of $.0005''$ total indicator reading. These drill jigs are operated in the same manner as drill jig No. 1.

In the No. 2 jig, of which no photograph is shown here, we locate the disc against two pins spaced at $1-7/32''$ radius and 120° apart. A spring plunger pushes the part against the pins. A hardened wear plate is mounted on the jig base for the part to rest on. Two sliding clamps are provided to hold the part firmly. First, the leaf with three No. 45 drill bushings and two No. 33 bushings is closed and the part is drilled. The leaf is opened and the other leaf, with three $.0915''$ and two $.1225''$ dia. ream bushings, is closed and the part is reamed. The bushings are rather small and the use of conventional type of slip bushings was considered unsatisfactory on this job. To be sure, slip bushings could be used; however, we do not use them because they would have to be made a few tenths smaller and, consequently, would cause inaccuracies. Furthermore, imagine the

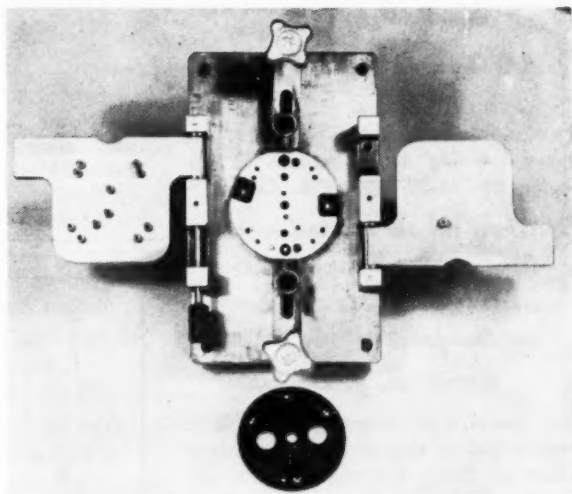
5. No. 3 jig. A two leaf drill jig for drilling and reaming. Right leaf contains three No. 51 and one $.500''$ drill bushing, left leaf contains three $.0758''$ ream bushings.





6. No. 4 jig. A two leaf drill jig with both leaves open. The part can be seen on the bottom of the jig.

7. No. 5 jig. The last in a series of two leaf drill jigs. Left leaves are used for drilling, right leaf for reaming.



waste of manpower involved in moving these slip bushings in and out of holes, to say nothing about the loss of production while the machine operator is fumbling around with them.

In the following three drill jigs which we have designed I shall list only the drill jig number and the corresponding figure number of the photograph. I might add that in No. 3, 4 and 5 jigs we

locate on two opposite .1225" reamed holes; otherwise operations are done in the same manner as in No. 2. These following three jigs are concerned with the same three discs mentioned in the No. 2 jigs.

NO. 3 DRILL JIG, FIGURE 5.

Operations are:

1. right leaf with three No. 51 (.067") drill bushings,

DICTOGRAPH

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2. right leaf with one .500" drill bushing,
3. left leaf with three .0758" ream bushings.

NO. 4 DRILL JIG, FIGURE 6.

Operations are:

1. right leaf with three No. 42 (.093") drill bushings,
2. right leaf with four No. 51 (.067") drill bushings,
3. left leaf with four .0758" ream bushings.

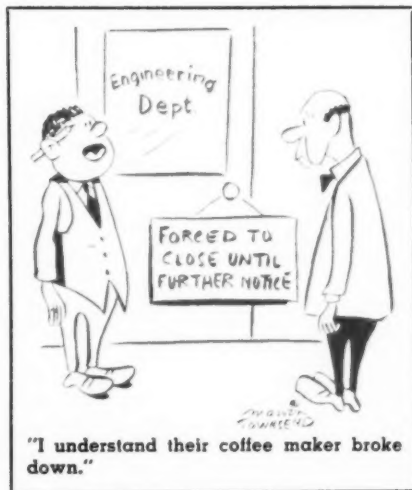
NO. 5 DRILL JIG, FIGURE 7.

Operations are:

1. left leaf with six No. 45 (.082") drill bushings,
2. left leaf with four No. 49 (.073") drill bushings,
3. left leaf with one No. 51 (.067") drill bushings,
4. right leaf with one .0758" ream bushing.

The above drill jigs have worked extremely well for us. They've saved us time and increased production over other methods we've used. In addition to the leaf-type drill jigs just described, we have several other types which solve some nasty problems for us.

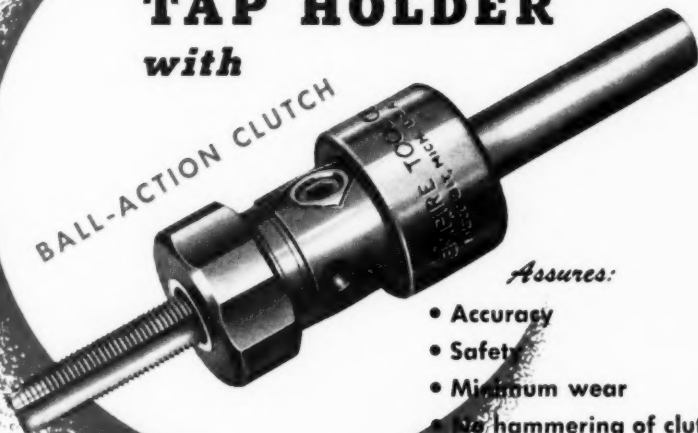
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There are thousands of riveters and millions of fasteners continually producing economical assemblies at a high rate of production. Yet, despite the present status of rivet manufacturing equipment and development of machines for the handling and setting of these parts, basic information about them and most efficient usage are still virtually unknown.

The Right Rivet for the Right Job Can Save You Time and Money . . . part 1

LIKE MANY small and inexpensive metalworking accessories, rivets are too often taken for granted. Rivets are rivets, we say; consequently, their full capabilities are frequently not realized.

There are untold opportunities for economical rivet applications of which the metalworking industry is not taking advantage. There are, after all, right and wrong applications, and numerous types of rivets for specific work. For those jobs on which standard rivets cannot be used, special rivets may fill the bill. The proper use of rivets, as well as their intelligent selection, can save you time and money on fastener jobs. I hope, in these two articles, to present facts about rivets which might aid in their proper selection and use. Discussion in these articles will be con-

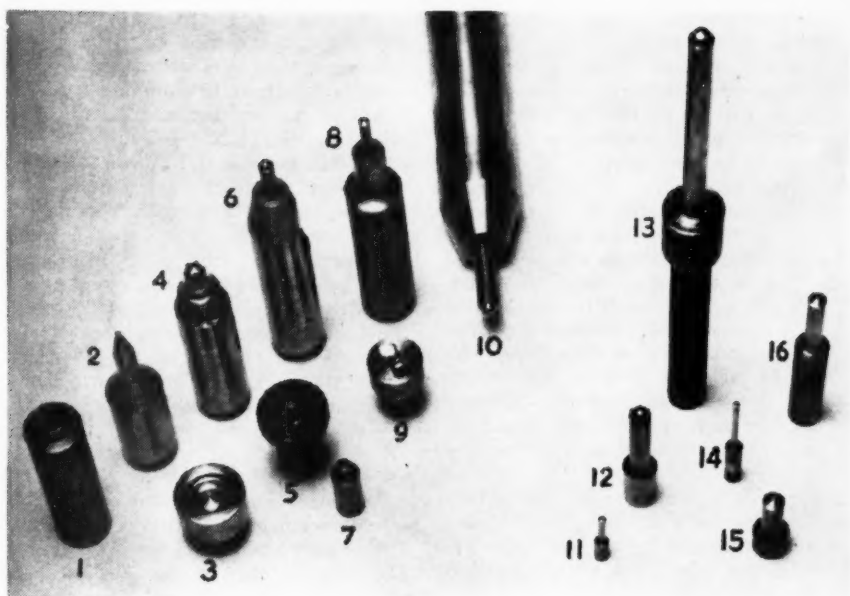
by **Robert M. Gordon**
The Milford Rivet &
Machine Company
Milford, Conn.

finied to the light assembly field and will cover the following:

1. Types of rivets
2. Riveting machines
3. Tools used in riveting operations
4. Specific applications of various types of rivets.

Extruded Rivets

There are two types of tubular rivets.



Construction and form of several of the most standard tools. Illustrated are, left to right: (1) star set anvil for deep drilled tubular rivets; (2) semitubular rivet anvil; (3) cap anvil; (4) star set anvil with pilot pin; (5) star set anvil; (6) semitubular roll set for drilled rivets; (7) semitubular roll set for extruded rivets; (8) semitubular roll set for extruded rivets; (9) open prong rivet anvil; (10) semitubular drilled rivet anvil; (11) pilot pin for semitubular extruded rivets; (12) pilot pin for deep drilled star set tubular rivets; (13) pilot pin for semitubular drilled rivets; (14, 15, 16) pilot pins for semitubular extruded rivets.

First to be considered is the **semitubular extruded rivet**. This fastener has an impression of predetermined, closely controlled depth and diameter which is tapered in form.

There are some types of pins and heading equipment which produce what is termed a **straight hole extruded rivet**. The side walls of the hole are quite parallel; however, the theory of manufacture is similar, and the extrusion can be recognized by the draw lines formed as the extruding pin wipes out.

Drilled Rivets

The second rivet is formed by a secondary operation performed on the blank produced from the conventional header. These blanks are drilled in automatic equipment and are of two types; **deep** and **shallow drilled**. The deep drilled part is known as a full tubular rivet and the drill point is practically to the head. The shallow drilled rivet, a "semi-tubular," is drilled to a depth suitable for the upset or

roll-setting which takes place in the riveting operation.

The semi-tubular rivets are used interchangeably except for the setting tools, as will be noted. Extruded rivets are limited as to length and diameter, depending on the limits of the manufacturing equipment. Above this point it is necessary to drill the blanks.

The full tubular rivet is used in piercing operations where the slug of pierced material is pushed up into the cavity. This rivet is often used in conjunction with a washer and, depending on the wire from which it has been made, can either be "star" or "roll set." Inasmuch as the deep drilling is best performed in harder, high carbon wire, this rivet is likely to crack or tear in several places.

The drilled rivets can be readily recognized by the perfectly straight, parallel walls formed by the drill, also the circular marks left by the cutting action of the drill.

Bifurcated Rivets

The second classification of rivets is the **bifurcated rivet**. Again, as in the drilled tubulars, a solid blank is produced by the headers and a secondary operation is performed to complete the fastener.

There are also two classifications of this type of rivet. One is produced by a broaching operation, where the rivet is automatically fed to broaches which cut the shank as the rivet is held rigidly in a split die.

The other is produced by a punch which breaks out a slug of material from the shank. The rivet is handled by automatic equipment as in the broaching operation.

The manufacturing operations which make these parts produce rivets which are identified as **sawed** or **punched**. The broaching or sawing operation produces a stronger rivet inasmuch as the prongs or legs are not distorted. This qualification makes it ideal for piercing

fibre, wood, sheet metal, etc. The punched rivet cannot be used in the heavier applications with as much success; however, it is suitable for cardboard, canvas and lighter piercing operations.

The full tubular and bifurcated rivets are often used in combination with what is known as a "cap." This part is not made on headers, but is a press operation. The tubular or bifurcated rivet is clinched into the cap for one or more of several purposes. Through the use of a cap the same general appearance can be produced on either side of the riveted part. The cap provides a stronger assembly and also a smooth, neater surface.

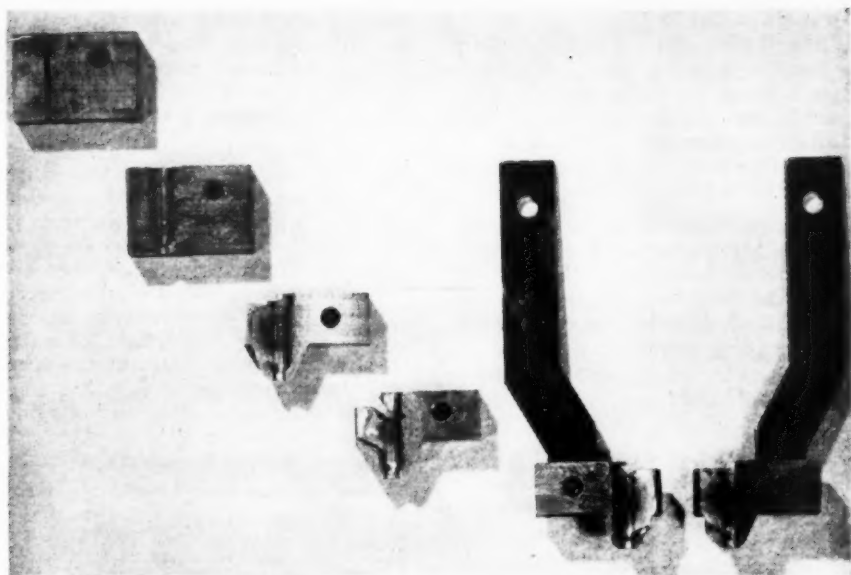
Compression Rivets

A third classification of rivets is formed from a combination of a deep drilled part and a solid, or blank, rivet. The relative sizes of the drilled hole and blank diameter are combined in such a manner as to produce a compression or press fit. The heads are usually of the same appearance and size. This combination produces a fastener with the same appearance on each end, having maximum strength. They are known as **compression rivets**.

The greater portion of compression rivets are made with "trimmed" heads. The rivets are hopper fed in automatic equipment and one at a time the peripheries of the heads are shaved or trimmed to be closely concentric with the shanks and closely held to diameter. This operation produces a rivet ideal for cutlery or utensil assemblies where it is necessary that the heads fit closely in counterbored holes, so as not to allow food particles or dirt to collect; also to eliminate the splitting of the wood or plastic handles.

Special Rivets

The last classification of rivets is extremely broad and covers the special fasteners typified by the **shoulder rivet**.



Sequence of steps in the manufacture of a jaw (top to bottom): (1) the blank; (2) after 1st drilling operation; (3) after slot-milling at front; (4) after groove-milling in track type jaw; (5) illustrates a complete pair of jaws for use in riveting machine.

The combination of a tenon and shoulder can be produced through a broad range of sizes, as required in a particular assembly. Shoulder rivets, and like fasteners, are made in several ways. The tenon can be **extruded** in the cold upset operation, by **squirting** the tenon diameter down into the counterbored die, from wire of the rivet shoulder diameter. This method of forming leaves an extruding angle between the shoulder and tenon of the rivet. The shoulder can also be formed starting from wire of the tenon diameter, and filling up the shoulder as the head is formed. This produces a relatively square shoulder formation. If neither of these operations can be employed, the blank is headed and the tenon turned in a subsequent operation, similar to the turning of the heads. In this instance the larger shank size is

cut concentric with the shank to the desired diameter and length. These rivets are made as semi-tubulars or full tubulars.

The foregoing classifications of rivets are illustrated in the accompanying illustration and the various identifying characteristics are easily recognized. The physical characteristics are important and have bearing on the success of the riveted joint. When analyzing an application, it is necessary to determine the correct type of rivet. Often the extruded, semi-tubular will successfully make a particular assembly, where the drilled part will not be successful. The sawed rivet will pierce better than the punched rivet; the compression rivet will afford appearance and strength. These points are further explained in the discussion of applications.

Riveting Cycle

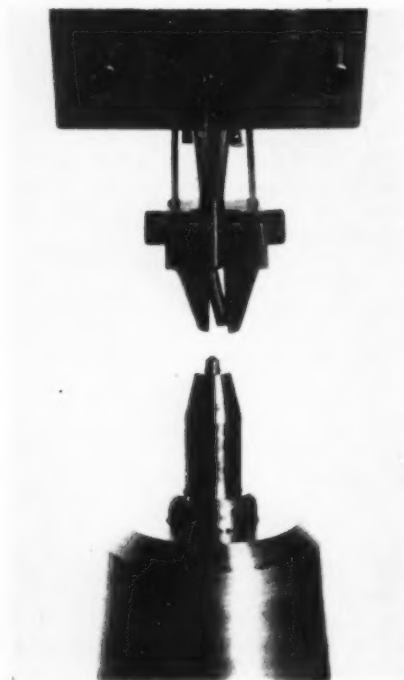
Riveting machines usually consist of a hopping system unit attached to a frame, floor or bench mount, which carries the treadle components in a foot-power-operated machine, or the motor, flywheel and clutch arrangement found in the power-driven models.

The hopper system is the most complicated part of the machine, consisting of a slotted bowl-shaped casting thru which the rivets feed out when the hopper is rotated, either continuously or intermittently. From the hopper the rivets feed by gravity to the tracks or rails. The tracks consist of an upper

and lower set which are separated by an automatically actuated shuttle or transfer mechanism which delivers one rivet at a time to the jaws. The rivet drops, shank down, into the jaws.

After the rivets have been hopper fed, it is necessary to hold the single rivet for the driving or setting operation. As outlined, the selected rivet is dropped into the jaws; above the jaws is the driver which descends, contacting the rivet head, which in turn lowers the jaws to a stop. At this point, the driver continuing the descent pushes the rivet thru the two halves of the jaws onto the plunger pin. Or, in the case of a piercing or blind rivet, into the

Close-up of jaws on large riveting machine in an open position . . . well spaced for work placement and ease of alignment by worker.



Large rivet machine jaws which have just received the rivet from the raceway, holding it in position for insertion by the driver into product assembly.



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Jaws of large rivets at point of contact where work being joined would normally be placed. The driver has advanced the rivet to the roll set plunger pin where it normally would form its clinch, or set. The condition and alignment of these tools are important and require periodic checking.

work. The rivet, in either case, is led or pushed thru the work, upsetting the anvil form.

Tools

Once the correct type of rivet has been selected, the correct tools must be employed in the setting operation. These tools are part of the rivet setting equipment and have a definite relationship to a particular rivet.

Before attempting to analyze the tools, it is necessary to know the type of clinch or set required of the various rivets. Again, starting with the tubulars, it can be seen that these parts are rollset, meaning that the portion of the rivet protruding from the work is

formed in a definite manner so as to take up tight, and form a round, full clinch. This clinch can be formed directly against the work, or a washer, or, as in some cases, must set freely in the air so as to form a pivot pin or axle.

The deep drilled or full tubular rivets are usually "star set." This particular tool is made in the form of a rosette or star which cuts the rivet, usually into 6 or 8 even segments. The deep drilled rivet generally punches its own hole, being driven and clinched in one operation.

The bifurcated rivets are usually set by means of a solid form inasmuch as they normally pierce the work. The protruding prongs are formed in the solid tip, forming back into the work to provide as smooth a clinch as possible.

The caps are held in a solid tip and the piercing tubular, or split rivet, is clinched into the cap.

Variations of these anvils are endless; however, the theory and practise remain the same regardless of shape, size or type. Several of the most standard tools are pictured in cutaway form to illustrate the construction and form.

Rivets are made to a reasonably close tolerance, and accordingly the tools must also retain this same degree of accuracy.

When a machine is tooled for a particular rivet any change in the rivet size will provide interference to the tools involved. A visual comparison of these details can be seen in the illustration showing the setup of the tools. The smaller the rivet size, the closer the relationship of the tools to the rivets. As the rivets increase in size, so their manufacturing tolerances increase, which allows greater tolerance in the tools.

This, in brief, is the riveting machine and riveting cycle, and, keeping this cycle in mind, we can now discuss the relationship of the basic tools of the machine—the driver, jaw and rollset.

Keeper of the Keys

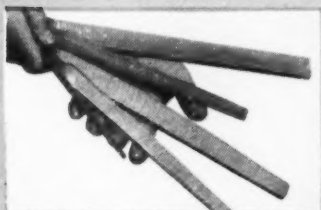
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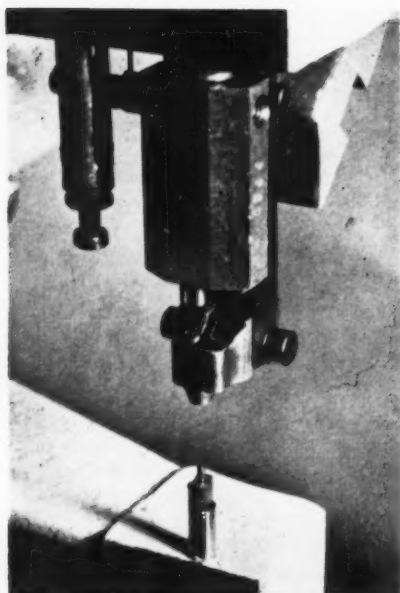
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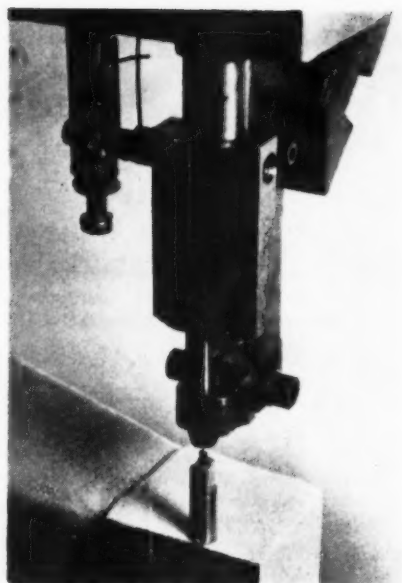
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Jaws on small riveting machine. Jaws are open, ready for rivet to drop from raceway when operator trips machine.



Jaws on small riveter. Note that driver has already positioned rivet in jaws just prior to clinching of work. Product to be assembled is not shown.

Driver

The driver is located in the ram or spindle of the machine and suited to rivet head diameter and shape.

Normally, the driver diameter is under the head size of the rivets by .005" to .025". A head diameter of .085" will take a driver diameter of .080"; whereas, a head diameter of .500" will have a corresponding driver diameter of approximately .475".

The working end of the driver is formed to the contour of the rivet head. Usually a "set edge" is provided to reduce cracking. The straight portion of the driver is held to the predetermined diameter for a length roughly equivalent to the length of the jaw. Above this point the driver is shaped according to the design of the tool. This is usually

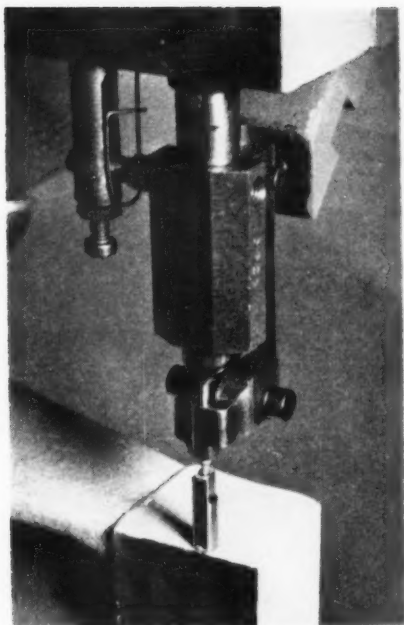
a standard construction depending on whether the tool is an insert or solid spindle type.

From this description of the driver it can be seen that the form, diameter and straight portion must be correct and suited to the rivet.

Jaws

The jaws are mounted on a sliding member mounted in the casting supporting the hopper system. They are usually spring-supported so as to allow the rivet and driver to pass thru. Construction is dependent on three rivet dimensions: head diameter, shank diameter and length.

The standard jaw is machined from two blanks, each $\frac{1}{2}$ the thickness of the jaw width. Usually a small "V" groove is milled in the blanks to provide a



Rivet on roll set where driver would normally have forced it through work and joined the product, or part, being assembled.

drill lead which prevents eccentricity. The blanks also have milled slots for the seating of the jaw springs.

After determination of rivet sizes the blanks are held face to face and a hole equivalent to shank diameter is drilled thru. The next drill is equivalent to the rivet head size; the depth of this hole is stopped at a predetermined point so as to provide a bearing for the rivet shank. The third drill size is from .015" to .032" over head diameter (depending on range of rivet sizes). The depth of hole provided by this drill is sufficient to allow the head of the rivet to be contained when received from the end plates of the rivet track.

After the drilling is complete, the two halves are laid open and the en-

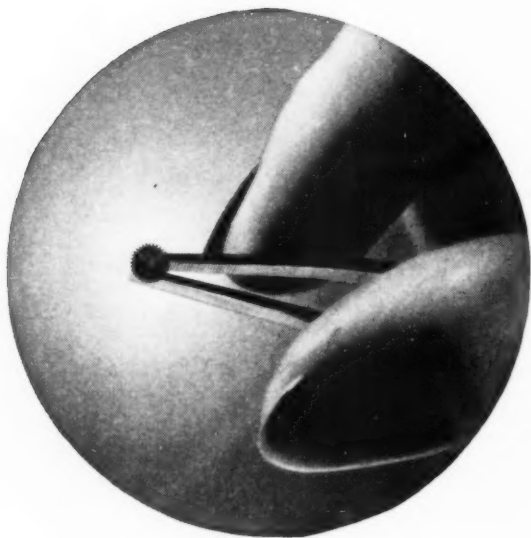
trance slot for the rivet shank is milled. One half of the shank diameter, plus an allowance for clearance and grinding, is cut in each half. After this operation, the jaw nose is shaped and the two halves atoned to relieve sharp corners. The heat treating operation follows and the jaws are ready for grinding. Both halves are again laid flat and the grinding allowance is removed. This produces slightly oval or egg-shaped holes which afford control of the rivet during the setting cycle. As mentioned, the jaws hold the rivet as the driver descends. The driver, being under rivet head size, does not open the two spring-supported jaw halves. After the jaws have stopped their travel, the rivet parts the jaws; passing on thru the work.

The foregoing method of jaw construction is inadequate for rivets having extremely short shanks or excess head weight as compared to shank weight.

When the relative sizes of the rivet are such that they turn over in the jaws, it is then necessary to alter the relationship of hole sizes. The hole diameter normally kept at rivet head size must be decreased until it is slightly less than the measurement of the rivet across the parallel lines formed by edge of the head and end of the shank, across to the opposite edge of the head. This is a condition not readily overcome in the field as special jaws must be used. Another effective means of preventing rivet turnover is by utilizing the track type jaw. In this instance, the upper cavity or chamber is eliminated and a circular groove and entrance slot are cut for the rivet head. This allows the head of the rivet to be controlled in a "T" slot from the hopper on down thru the tracks into the "T" formed by the undercut in the jaw cavity. Illustrations of the various steps in the standard and track jaws are shown.

End of part 1. Concluding part will appear in the May issue.

Hour wheel, 140" diameter with 32 teeth, hobbed with a Barber-Colman special fine pitch hob. Thickness of teeth may not vary more than .0003" on each wheel.



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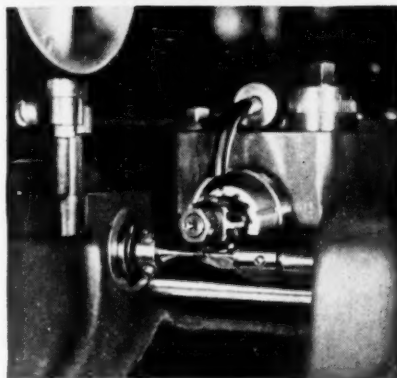
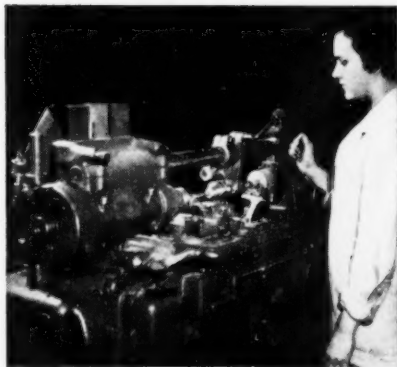
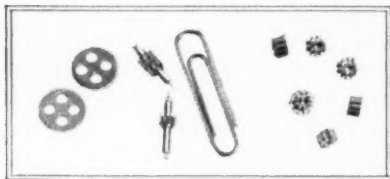
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120 D.P. Instrument Gears

Typical of the range of fine pitch work in the plant of a large precision instrument maker, this hobbing job requires a good grade of commercial gear on a high volume basis. A battery of three Barber-Colman No. 6-10 Hobbing Machines produces 6000 gears per hour with 50 blanks mounted on an arbor. Close tolerances are consistently maintained at this rate of production. Fast loading and unloading is accomplished with air-operated tooling equipment. Here are the specifications: 50-tooth Spur Gears, 120 D.P., .422" O.D., .030" face in brass. Hob — $1\frac{1}{8}$ " x 1" x $\frac{1}{2}$ ", Ground Multithread. Feed per revolution of work .020"; Hob Speed 1200 rpm.

180 D.P. Pinions

On another job, precision small pinions, .111" O.D. x .086" face, 18-tooth, 180-pitch are hand loaded and hobbed within a tolerance of .0003" on the pitch diameter on the No. 1- $\frac{1}{2}$ Hobbing Machine. Since extra fine finish is required a feed of .012" per revolution of work is used with an hourly production of 270 gears. Hob speed is 1795 rpm. A Barber-Colman ground hob, $\frac{3}{4}$ " O.D. x $\frac{1}{2}$ " x .315", averages 850 pinions between sharpenings. Special tooling for magazine loading of the No. 1- $\frac{1}{2}$ machine is available as extra equipment.



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Get More Production . . .

Finer Finishes From Your Reamers

by **F. R. Sund**, Reamer Engineer
Small Tool Div., Barber-Colman Co.
Rockford, Illinois

EFFICIENT REAMER operation is dependent upon many variables, including reamer design, rigidity of machine and tooling, feed, speed, stock removal, coolant and sharpening control, figure 1. With proper control of these elements, increased accuracy and better finish should result. In fact, improved quality of the reamed surface can often be obtained at little or no extra cost if the proper tools and methods are used.

Reamer design

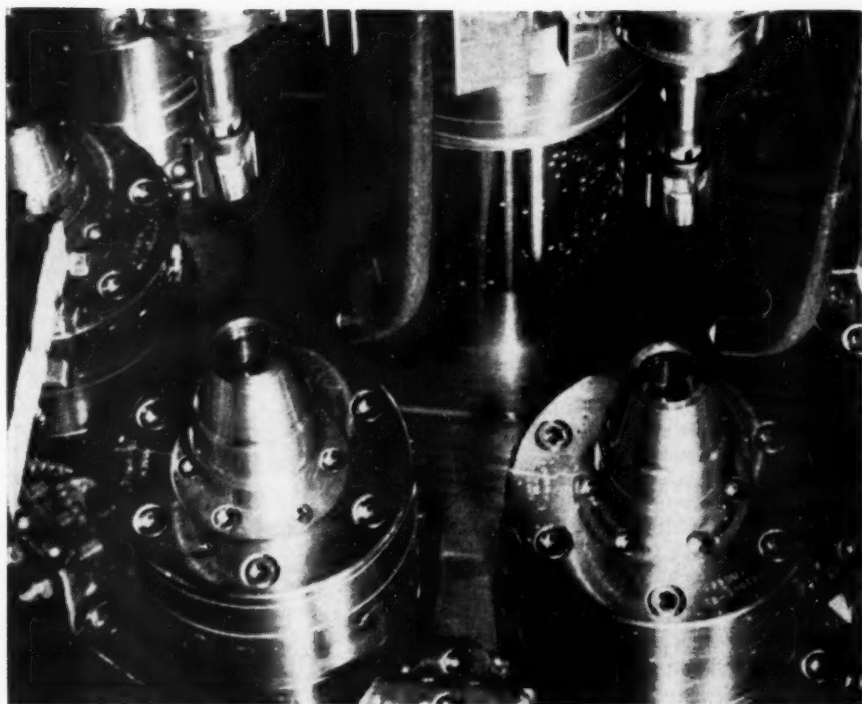
The elements of the profile of a reamer usually include the chamfer, lead, straight portion and back taper, figure 2. These elements are often changed slightly before the ideal one is established for a particular job. Although there is no set of hard and fast rules concerning the ideal profile, there are certain guide posts which may indicate the approximate form to be used. Actual on the job experience will then show the slight variations required.

The amount of chamfer is determined

by the amount of stock to be removed and the type of material to be cut. Normally, a 45° chamfer is used for general purpose reaming when a moderate amount of stock is to be removed. For light cuts, a chamfer of 25° to 30° may be used. For heavy cuts which require end cutting, the chamfer may be increased to as much as 75° .

The primary purpose of the lead is to control the size and form of the chip. It often produces a smoother finish and permits heavier feeds. It may be varied both as to angle and length, depending upon the type of material to be cut.

The straight portion is made parallel to the reamer axis. Its purpose is to iron out the feed marks which would otherwise be left on the reamed surface and to steady the reamer in the cut. It is usually made about $\frac{1}{8}$ " longer than the amount of feed per revolution. The back taper provides clearance for the back part of the blade or flute and eliminates the possibility of scoring the surface on the return stroke. It can be varied depending



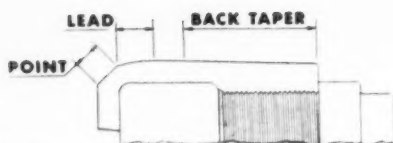
1. These carbide tipped reamers produce 1300 pieces per sharpening, holding the finish within 60 micro inches.

upon machine alignment, amount of heat generated, the stability of the reamer in the cut and material condition.

Another feature of reamer design is the land behind the cutting edge. This land should be wide enough to help guide and steady the reamer in the hole. The width should be sufficient to eliminate chatter, but it must be narrow enough to prevent rubbing and galling. Generally, a land of .008" to .010" for all types of materials is used when the reamer is sharpened to a theoretically sharp cutting edge. When the reamer is sharpened with cylindrical lands, the lands should be varied

to suit the different materials. For cast iron and bronze, a land of .008" to .010" is recommended. For steel and copper, .003" to .005" lands are used with .010" to .020" for aluminum. Reamers for use in stainless steel should be ground to a sharp edge. The width of land can be varied to prevent a rough finish caused by chips clinging to the land and scraping the sides of the hole.

For a fine finish and smooth cutting action, the reamer blades or flutes should be unequally spaced around the periphery, figure 3, of the reamer. This type of spacing prevents the reamer from forming welts. However, the blades or flutes should be spaced dia-



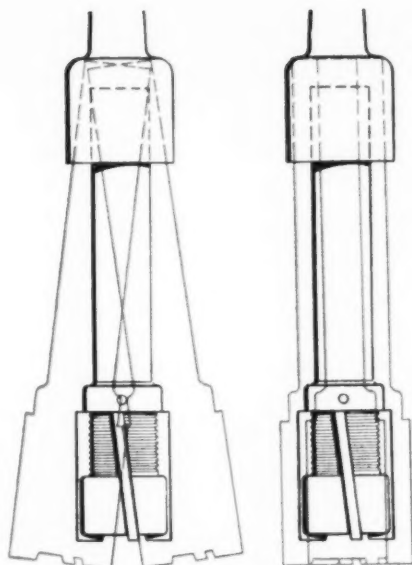
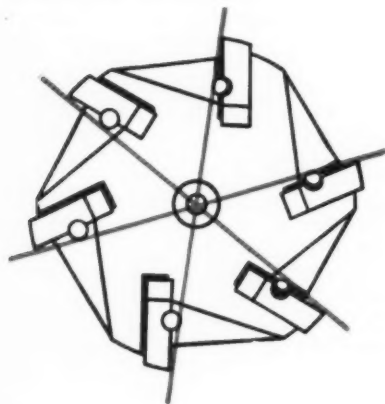
2. Elements of good reamer design.

metrically opposite each other so that the diameter can be inspected with a micrometer across any two blades or flutes. Also, the finish will be better as the number of cutting edges is increased.

In addition to improving the finish, a small helix angle on the blades or flutes usually helps to stabilize the reamer in the cut and prevents chatter. It is usually necessary to have the hand of the helix opposite to the hand of the cut to prevent the tendency of the reamer to pull itself through the cut. The angle is usually between 3° and 10° because larger angles tend to build up end pressure. On blind holes when coolant is fed through the reamer, a right-hand helix helps to start the chip in the right direction to be washed out by the coolant.

Tooling

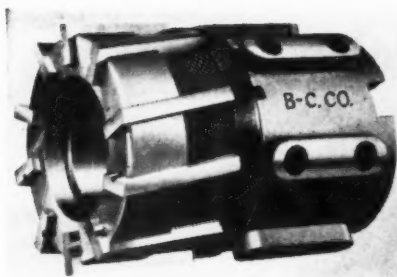
Since reaming is used primarily for finishing and sizing holes that have al-



4. Angular and lateral float.

ready been bored and located by a previous machining operation, a critical part of efficient operation is the driving and holding equipment. In holding the established accuracy or location of the bore, either the reamer or the work must be free to move into proper alignment. If the work moves, the reamer is held rigidly in the spindle, and the work is located accurately by means of jigs, figure 4. However, if the work is held rigidly, the reamer must move or float freely to avoid producing bell-mouthed, tapered or out of round holes. Either a lateral or angular float can be used.

Lateral floats allow the reamer to move in any direction, always holding the reamer axis parallel to the axis of its shank and to the drive spindle. They are adaptable where parallel alignment between holes must be maintained. The float will compensate for slight misalignments and indexing errors in the machine.



5. Bronze wear strips.

Angular floats permit freedom of movement in all directions from a fixed socket or drive, thereby centering the reamer to the work. These floats are commonly used in screw machines or turret lathes to compensate for slight errors between the work spindle and the tool holder. They frequently make use of a pilot or starting taper on the reamer nose to guide the tool into alignment. A special type of angular float has been developed by Barber-Colman for use with its oil-feed screw machine reamers. The reamer is held firmly with a spring to prevent any sagging. Its simple design, consisting

of only the holder, drive pin and spring, makes it easy to operate and maintain.

Many different designs and styles of pilots can be incorporated into reamers as integral parts. These may function either by guiding the reamer in the hole being reamed or by guiding through a jig bushing. These pilots may be equipped with wear strips whenever the diameter is large enough to permit it, figure 5. As the pilot wears down with repeated use, the wear strips are shimmed and reground accurately to the original diameter. Chrome plating also helps to eliminate pilot wear. Approximately .0005" to .001" clearance is usually provided between the pilot and the hole.

When the reamer is fixed and the work moves into the correct position, guide bushings should be used. The ideal setup employs a jig with guide bushings and floating reamer with a minimum amount of overhang. When possible, the reamer should be guided on both sides of the work. It is important when the reamer is not piloted that the spindle be aligned accurately to prevent the reamer from jamming the top of the bushing, figure 6. If

Speed Table

| MATERIAL | S.F.M. |
|---------------------------------------|---------|
| Magnesium and its alloys | 170-270 |
| Aluminum and its alloys | 130-200 |
| Bakelite | 70-100 |
| Brass and Bronze, ordinary | 130-200 |
| Bronze, high tensile | 50-70 |
| Monel metal | 25-35 |
| Cast iron, soft | 70-100 |
| Cast iron, hard | 50-70 |
| Cast iron, chilled | 20-30 |
| Malleable iron | 50-60 |
| Steel, machinery .2C to .3C | 50-70 |
| Steel, annealed .4C to .5C | 40-50 |
| Steel, tool 1.2C | 35-40 |
| Steel, alloy | 35-40 |
| Steel, automotive forgings | 35-40 |
| Steel, alloy, 300-400 Brinell | 20-30 |
| Steel, free machining stainless | 40-50 |
| Steel, hard stainless | 20-30 |

sliding jigs are used, great care must be taken to avoid damage to the reamer. Protective bronze or fibre caps are sometimes used with the bushings, especially when using carbide-tipped reamers.

Speed and Feed

Spindle speed is dependent upon the type and hardness of the work material, rigidity of the machine and tooling and the tolerances or quality of finish required. In general, reaming speed should be only about 65% to 75% of that used for a similar type of drilling operation. For increased production, the normal procedure is to increase the feed while maintaining a slow speed. This produces a cooler, freer cutting action and eliminates chatter. The table may be used as a guide in establishing the speed for reaming various types of material. Lack of rigidity in the machine, fixtures or tooling may require the use of speeds which are slower than shown in the table. By the same token, higher speeds may be used with very rigid setups and with machines that are in good repair.

Feed for reaming is usually considerably higher than for drilling. A suggested rate of feed is approximately three times that used for a similar drilling operation. Generally, steel may be reamed at feeds ranging between .0015" and .010" per revolution, depending upon the hardness. Feed for stainless

steel may vary from .003" to .008". For cast iron, the range is from .006" to .012", while it may vary from .005" to .015" for reaming non-ferrous and non-metallic materials. These feeds can be increased considerably when cam controlled sharpening is used. Carbide tipped reamers often permit greater feeds and speeds, particularly when cutting extremely abrasive or hard materials.

Stock Removal

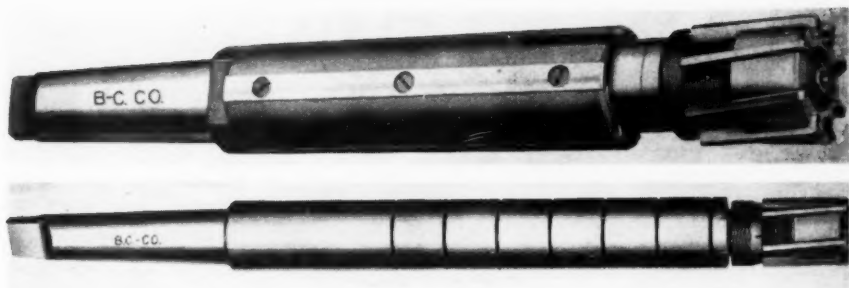
Ample stock must be left for the reamer to allow it to take a definite cut. An insufficient amount of stock may cause scraping or glazing, which results in undersize holes and rapid reamer wear. On the other hand, for finish reaming the amount of stock should seldom exceed .012" on the diameter. The most efficient amount of stock removal is the product of many variables, but the table for high-speed steel reamers may serve as a guide in establishing the amount of stock for a particular job. Carbide tipped reamers can usually remove more stock than equivalent reamers of high-speed steel.

Control of chatter

Rigidity of setup is important in preventing torsional deflection and chatter. Chatter is detrimental to both the reamer and the hole and should be controlled closely. Reamers should be solidly mounted, preferably in taper

Stock Removal Table

| MATERIAL | SEMI-FINISH REAMING | FINISH REAMING |
|-----------|---------------------|----------------|
| Copper | .020" | .010" |
| Babbitt | .030" | .007" |
| Bronze | .030" | .010" |
| Cast iron | .050" | .015" |
| Steel | .030" | .010" |



6. Piloted reamers.

sockets. Adequate support is necessary in the way of guide bushings and shank design, and the machine spindle must be tight. Chatter is even more detrimental to carbide tipped reamers than to those of high-speed steel, making it necessary to eliminate all elements which might cause chatter.

If chatter exists, the following check list may be used as a guide in eliminating the possible causes.

1. Increase the feed.
2. Reduce the speed.
3. Use a reamer with irregular blade spacing.
4. Be sure that the blade profile has a lead behind the chamfer.
5. Decrease the amount of back taper.
6. Increase the width of land at the cutting edge.
7. Guide the reamer with a pilot and bushing.

Coolants

Since reaming is normally an operation requiring the removal of a very small amount of metal, a properly designed tool should cut freely and easily in most materials without generating much heat. Consequently, the use of coolants with reamers is primarily recommended to aid in finer finishes rather than to dissipate heat.

A coolant may sometimes defeat its own purpose, however, by carrying the extremely fine particles of metal back

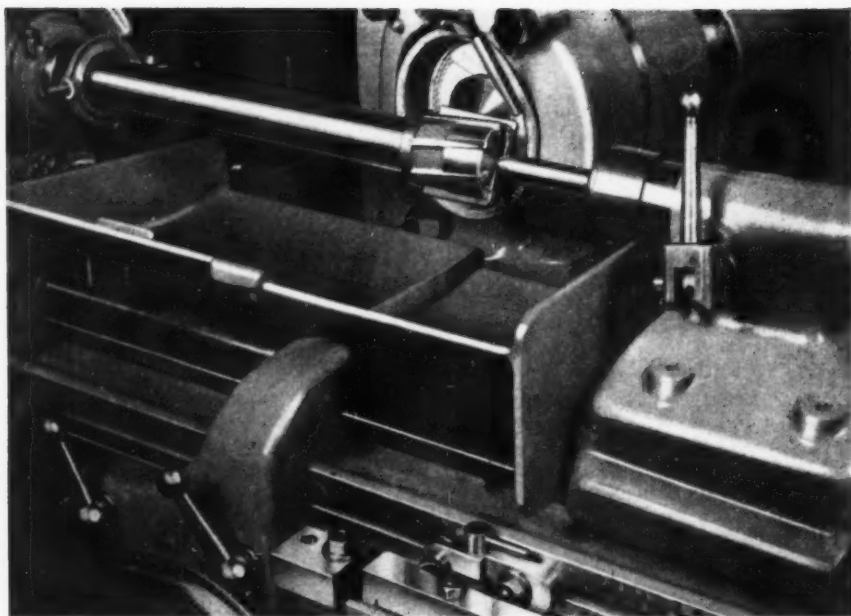
into the work area, reducing the quality of the finish rather than improving it. Some users have found that magnetic coolant separators eliminate the slivers and chips from the coolant so that only the clean fluid is brought back to the work area.

Most any standard type of coolant or lubricant may be used for reaming. Ordinary soluble oil and water produce good results. Lard or paraffin base oils are often used when superior finish is desired. For recommendations for a particular job, see your regular supplier of cutting fluids.

Reamer Sharpening

Sharpening of reamers should be carefully controlled to maintain efficient operation. When the best profile has been established through tryout on the job, it is important that this profile be accurately reproduced whenever the reamers are sharpened. The standard method of sharpening is to grind the diameter, back-off the flutes and grind the chamfer. This method is considered adequate for many reamers.

For many high-production jobs, the standard method does not control the profile accurately enough. Barber-Colman has developed a method by which the control of the profile is simplified. By means of a form cam which controls the cross motion of the table,

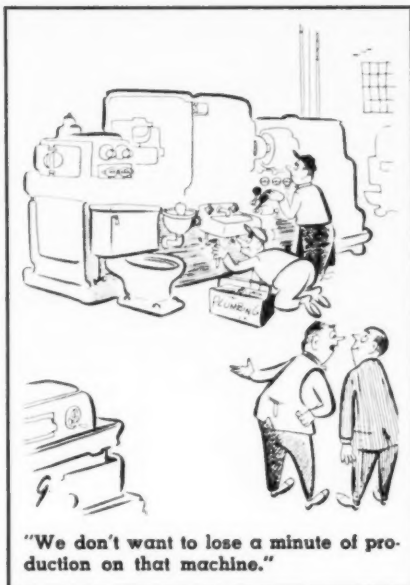


7. Profile sharpening on the Barber-Colman combination sharpener.

the profile can be controlled easily and accurately on the Barber-Colman machine, figure 7. Also, the land can be ground to a theoretically sharp edge rather than the cylindrical land obtained by the standard method. The sharp edge makes it possible to produce finer finishes. Investigation of this specialized sharpening method may be worth while if high production, accuracy and fine finish of reamed surfaces are important.

The End

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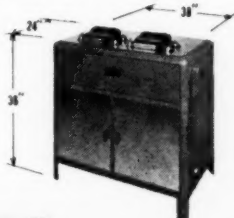


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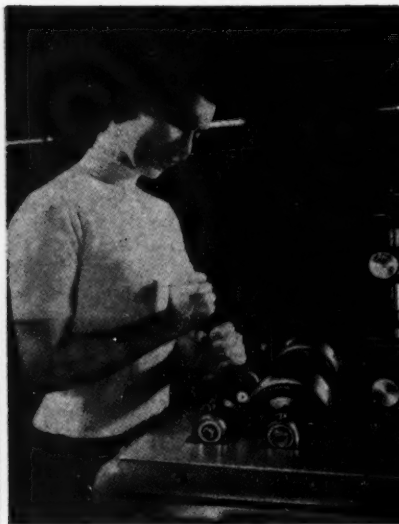
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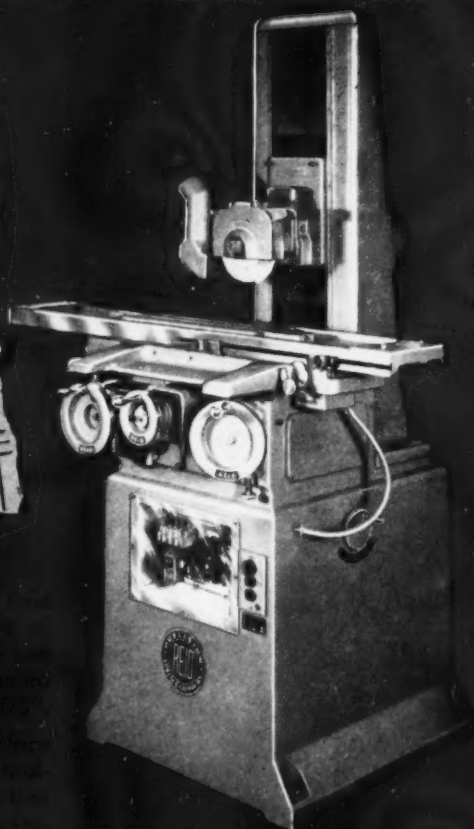
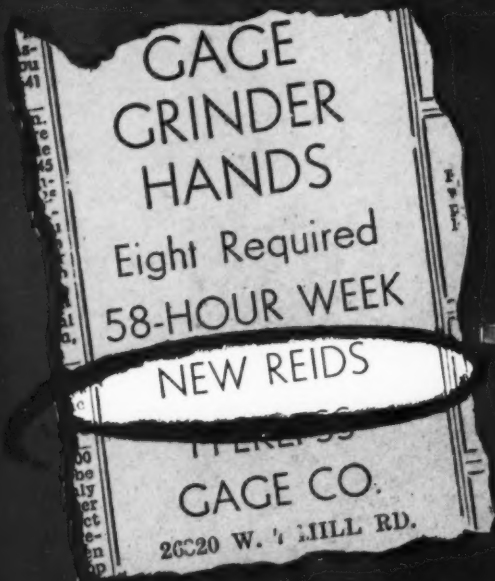


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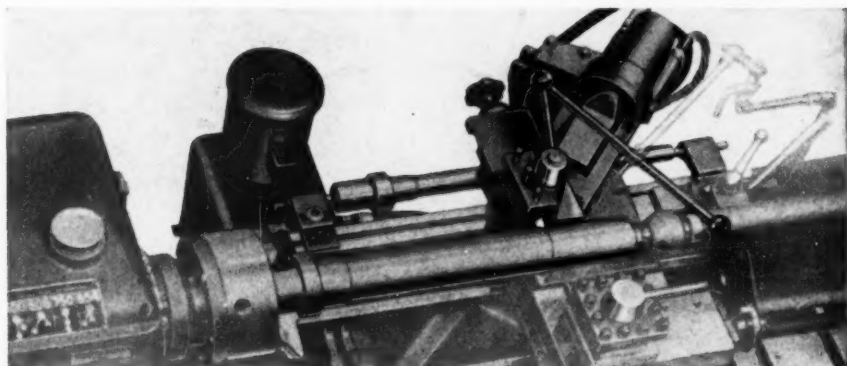
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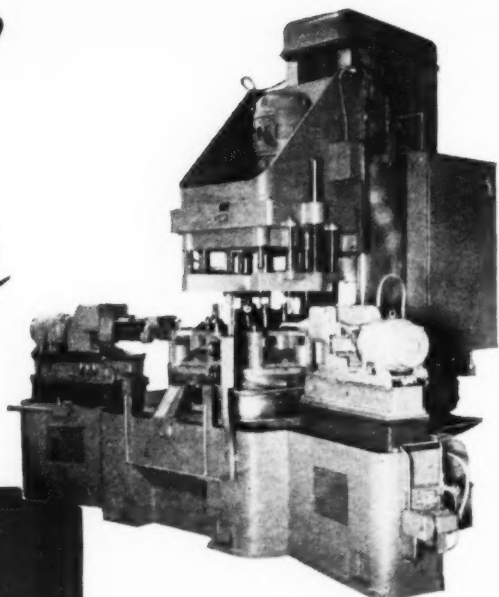
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Automatic Cam Milling Fixture

BATCHES of small cams of various shapes, but not exceeding $1\frac{1}{2}$ in. maximum radius, are regular products of one firm with which the writer is associated. All the cams have circular and parallel shanks integral with them which enables them to be held in a collet during the milling of the cam surface. With the object of performing quick changes from one cam shape to another the cam milling fixture here described was designed and constructed.

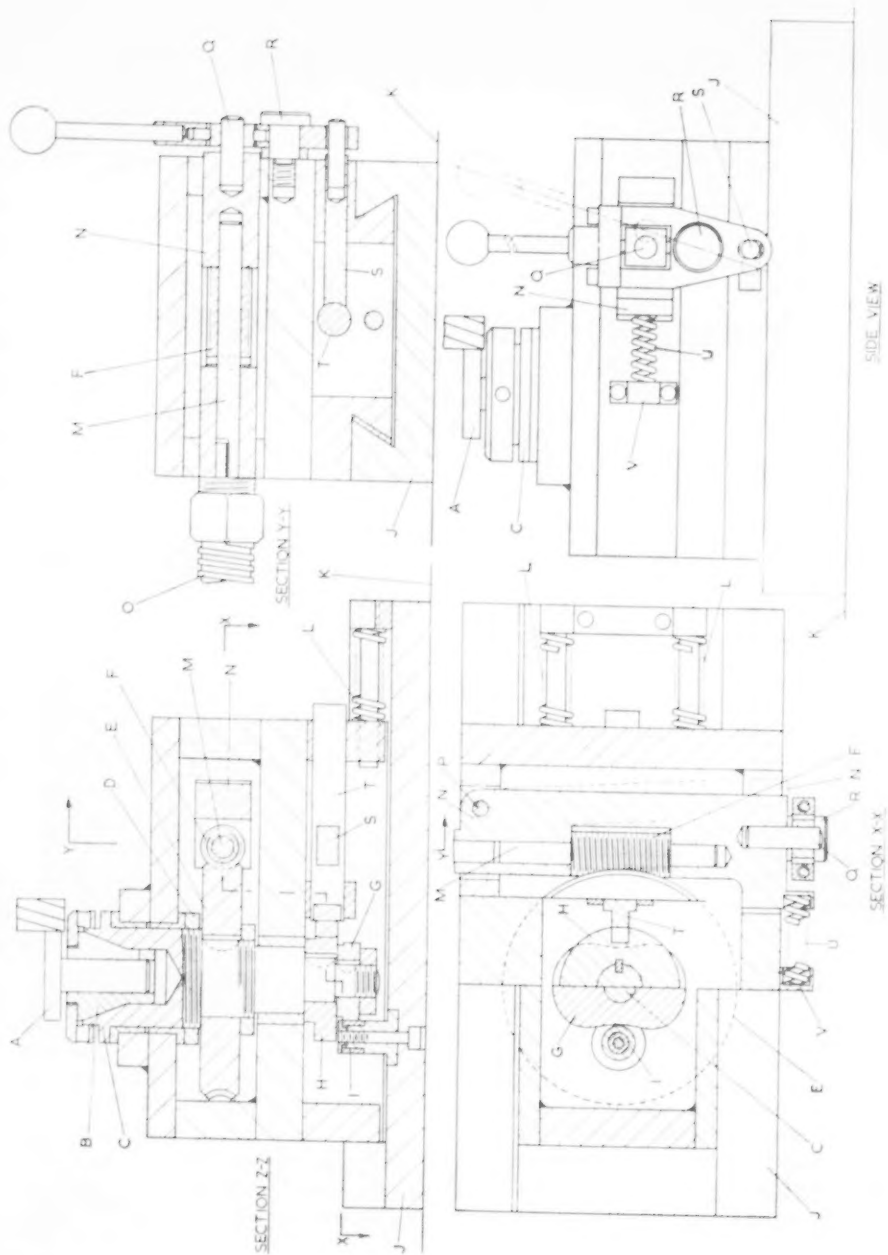
A vertical milling machine of standard construction is used for the milling of all types of cams. This allows end milling cutters to be used in production, the cutter diameters being selected to suit any concave radii which may be part of the cam profile. In cases where there are no concave radii on the cam, a large diameter cutter may be used and heavier cuts taken.

The fixture uses the master cam and roller follower system of generation

by **Tom Brown**

and the change from one cam profile to another is achieved by changing the master cam. In some cases a new location is necessary for the roller follower, but by designing the master to suit the fixture dimensions it is possible, in the general run of work, to use the one follower in the one position.

Section Z-Z shows a vertical cut through the fixture. The cam to be cut is shown at **A**, gripped by its shank in the pulldown collet **B** which is tightened by means of a gland type nut



having holes around its periphery for engagement with a suitable bar. The split collet can be interchanged with any other of a size to suit the shank on other cams. It seats in a suitably tapered recess at the top end of the main spindle **C**.

The main spindle is supported at its upper end in a bearing lined with bronze bushes and is located axially by means of an integral shoulder and an adjustable threaded thrust collar **D**. Below the thrust collar is the worm wheel **E** which is keyed to the main spindle. A worm **F** engages with the worm wheel and rotates it and the wheel, in turn, rotates the main spindle. It will be apparent from section **Z-Z** that the body of the fixture forms a container for the worm wheel drive and thereby protects it from dirt and foreign matter. A second plain bronze sleeve bearing supports the lower end of the main spindle.

At its bottom end the main spindle passes out of the container section of the fixture body; fixed to this lower extension is the master cam **G** which is surmounted by the catch plate **H**. Both master cam and catch plate are keyed to the main spindle and, therefore, rotate with it. The purpose of the catch plate will be explained later.

Also shown in section **Z-Z** is the hardened roller follower **I** which is in contact with the edge of the master cam. The roller follower is a sleeve which can rotate upon a shank fixed to the base plate **J** of the fixture. The base plate is secured to the surface of the milling machine table **K** and consists of a dovetail slide (see section **Y-Y**) in which the upper part of the fixture body can reciprocate under the action of the master cam.

Reviewing the action of the fixture thus far: the machine table is fixed in relation to the machine cutter spindle, and the only slidable portion is the upper part of the fixture which

moves the component axis towards or away from the cutter as the main fixture spindle is rotated. Rotation of the spindle causes the master cam to ride on the surface of the fixed follower on the base plate. As the master cam radius becomes smaller, the top part of the fixture moves to the left and carries the component axis away from the cutter axis, thus increasing the radius of the component cam.

It will be apparent, from the above, that the master cam is a reverse copy of the component cam. Reverse copy master cams are difficult to make accurately and are expensive, but they have the advantage that the pressure of the cutter on the component holds the master cam and follower in engagement and heavy counterweights or springs, or hydraulic pressure, are not necessary when reverse profile master cams are used. The components machined in this fixture were in sufficiently large quantities to warrant the expense of making reverse copy master cams for the fixture.

Initial pressure for holding the master cam and follower in contact with one another is provided by the compression springs **L** which bear at one end on an anchor block affixed to the base plate and at their other ends on the sliding portion of the fixture. The springs are prevented from buckling out of line under pressure by means of the rods which pass axially through their centers.

The aforementioned catch plate **H** is part of an automatic stop mechanism which disconnects the worm wheel drive and locks the main spindle in a stationary position at the conclusion of one complete revolution. Most cams are run around twice by the cutter, the initial cut roughing off the stock while the second, and lighter cut, produces accurate size and smooth finish. In order that production time should not be wasted, it is necessary that the

operator be aware that the main spindle of the fixture has made a complete revolution. The automatic disconnection of the spindle drive serves this purpose.

On constant lift or snail type cams, the finishing position for the cutter traverse is often at a radial face extending from the minimum to the maximum cam radius. On such cams, the radially placed face denotes the start and finish of the cut and this is automatically provided for by the catch plate **H** which automatically stops the revolving of the cam component against the cutter.

Section **X-X** shows a distorted plan view of the fixture interior and serves to illustrate the working of the automatic stop mechanism. The worm **F** is fixed to the spindle **M** and is retained axially between the faces of a gap formed in the worm housing **N**. Spindle **M**, which drives the worm, is driven by

means of a flexible shaft of the heavy duty type which is revolved by means of a motor mounted upon a floor stand placed adjacent to the milling machine base. The floor stand is fitted with four-step V pulleys and a belt so that the speed of the shaft can be varied to suit different cam materials and depths of cut. The flexible shaft connection to the worm housing is shown at **O** in section **Y-Y**.

Referring back to section **X-X**, worm housing **N** is of rectangular section material and pivots horizontally upon the hinge pin **P**. When the housing is swivelled in a right-hand direction upon the pin, the worm is pulled clear of the worm wheel and the main spindle of the fixture ceases rotation. The reverse effect is obtained when the worm housing is moved in a leftward direction. The worm housing is guided and supported in its horizontal movement by means of rectangular apertures ma-



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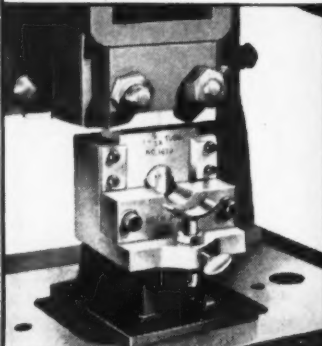
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chined into the side walls of the fixture body. The worm housing is a close sliding fit between the upper and lower surfaces of these apertures and is thereby supported fully when under stress.

To slide the worm housing leftward and engage the drive to the main spindle, a lever at the front of the fixture is actuated by the machine operator. A pin **Q** protrudes from the free end of the worm housing and engages with a small universal joint incorporated in the lever. The construction of this joint is shown in the various sections and it is a necessary fitting because the lever is pivoted about the stud **R**. The lower extension of the lever engages with a horizontally sliding flat bar **S**, the inner end of which is secured to the horizontally sliding latch pin **T** situated between the dovetails of the fixture base. The latch pin can engage snugly with the slot cut into the periphery of the catch plate **H**, which was mentioned earlier in this article and which can be seen in the plan section **X-X**.

Since both worm housing and latch pin **T** are connected to the lever on the front of the fixture, a single movement of the lever will cause both attached elements to move in opposite directions to one another. For instance, movement of the lever leftward will engage the rotating worm with the worm wheel and will withdraw the latch pin **T** rightwards from the slot in the catch plate **H**, which will revolve with the fixture's main spindle. The catch plate diameter and the latch pin axial position are arranged so that as the slot in the plate rotates away from the pin, the pin end rides on the periphery of the plate and holds the worm drive in engagement. The catch plate must thus make one complete revolution before the latch and slot are once more in line with one another. When this occurs,

the latch pin jumps leftward into the slot in the plate and by virtue of its connection with the lever, pulls the worm housing in a right-hand direction and breaks the worm drive engagement, thus stopping the main spindle. The cycle of one complete rotation can be initiated by the machine operator's pushing the lever leftward again.

Automatic leftward movement of the latch spindle for stopping the cycle is accomplished by means of the compression spring U shown in the side view. This will be seen to fit in a recess in a small bracket V fixed to the fixture body and in a similar recess at its other end, integral with the worm housing. The spring is thus always exerting pressure to push the lever to the right and disengage the worm drive. It thus communicates movement in a leftward direction to the latch pin so that this will always engage with the slot in the catch plate periphery when it travels round into line with the pin.

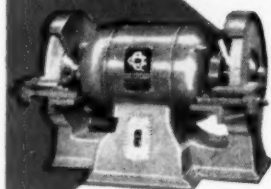
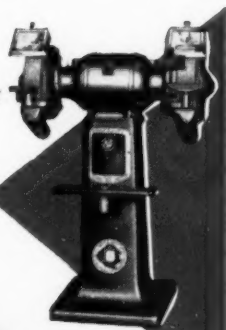
The fixture is constructed in steel throughout and welding has been used wherever possible. Some of the screws and dowels used to retain various parts in place have been omitted from the various views on the drawing, in the interest of clear presentation. The fixture has proved to be a worthwhile investment and has been used for a wide range of small cams which are produced in large batches. The fixture is essentially a piece of high production equipment but it is of interest because of the various mechanical movements involved in its construction.

The End

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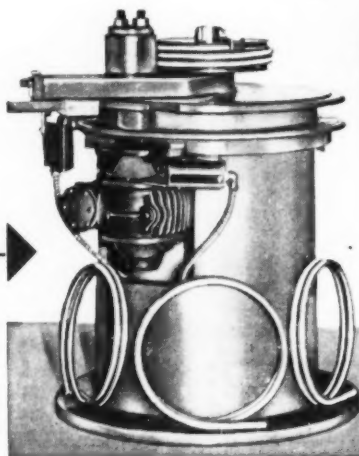
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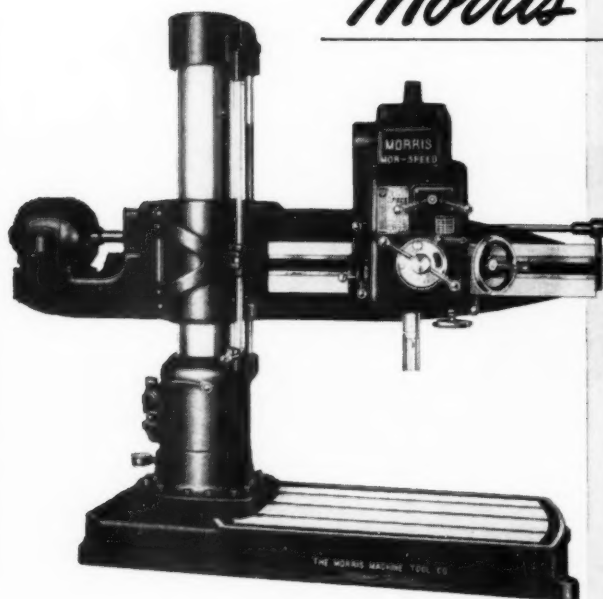
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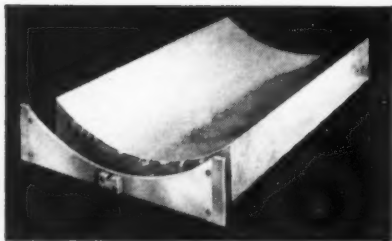


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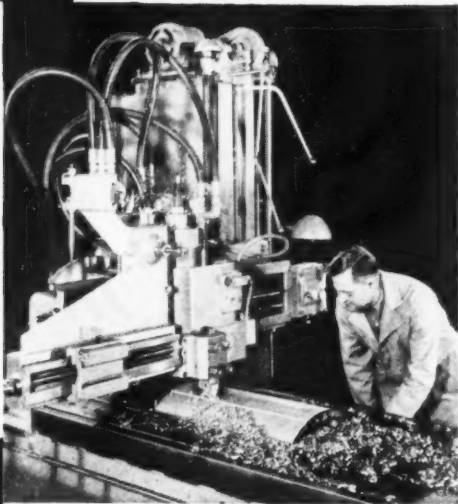
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Hundreds of Holes Drilled Economically in Stainless Steel Jet Rings

by **Arthur A. Merry**

Chief Advanced Tool Engineering,
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THE TRUE measure of any machine tool's efficiency is the number of pieces it piles on the floor each day. When a machine runs constantly one may rest assured the pieces are being piled up; this is exactly what this machine, designed to drill holes in jet engine rings, will do. It drills hundreds of holes with a minimum of down-time for drill changes.

It might be well to restate the reasons for designing this drilling machine. A jet engine is basically round, and generally made of stainless steel or one of the other hard, new alloys. The various sections are bolted together by means of small, closely spaced hundreds of small bolts. Because of the material and the huge number of holes to be drilled into it, the operation has its problems.

You might ask: if there are so many holes to be drilled, why not use multiple spindle drills? Multiple spindle drills capable of drilling the diameters

we are drilling are tremendous in size and expensive. A multiple spindle drill is usually associated with high production, with one part running over a machine day in and day out. For our type of work they are not generally economical for when a drill fails in a multiple spindle machine it is necessary to change all of the drills, as many as 120 of them. As you know, drill failure happens all too frequently when drilling stainless steel.

In the aviation gas turbine engine business we are not concerned with large numbers of parts as such; instead, we are concerned with a large number of different parts of which only a few are required monthly—few, when measured by high production standards. This means we cannot afford the luxury of having single-purpose machines at this stage of our operations. For these particular operations we question whether a multiple spindle drill could ever be



The drilling machine which drills hundreds of closely spaced holes in circular jet engine rings. There are several advantages to this machine over multiple spindle drills:

tool changes are easily accomplished without costly downtime; it is suited for a large variety of circular work; there is no need for expensive and clumsy jigs.

Insert: in the immediate foreground is the indexing box containing cylinder and shot bolt. Immediately to the right, and located in the lower groove of the table, notice the adjustable stops which can be used for operating limit switches when it is necessary to limit the operation of one or more of the heads. Also clearly visible are the indexing pins. While most of them are covered with a rubber bushing, the first one is uncovered. The rubber bushings kill the index pins which are not required during a particular operation.

made to pay owing to the large amount of down-time due to changing drills, to say nothing of the danger from drill breakage.

We thought it advisable to design a drilling machine which would give us a high rate of production, would be in constant use, economical to set up and to run, and would limit expensive down-time in the event of drill breakage. We believe the machine as designed fulfills all the requirements and, in addition, has enough versatility to adapt it to changing parts.

The base is machined with two circular guide tracks. These tracks are practically 360° around the base of the machine, except for the open portion, which can be seen. The table is mounted on a large spindle traveling on a row of ball bearings located nearly to its outside circumference, which is 48". The purpose of the handrail is to index the table, which can be done with no effort.

Around the base of the table and in a separate ring you will notice a row of little pins, these are the index pins which extend around the entire table. Also note that over some of the pins we have placed rubber bushings; this, in the present setup on the machine, isolates the index pins not in use. Only the index pins which are used are exposed; thus providing a safety factor. The pins are shown more clearly in the insert photograph.

The front of the machine has a foot operated switch that actuates the shot bolt by air, which is in the form of a vee, locating around the exposed pin and directly in line with the cylinder that is shown in the immediate foreground, see insert photo. Nothing happens unless this shot bolt is in its proper position. It is controlled by a limit switch.

When the machine has been properly indexed, one button is pushed on the

operating panel at the right. This actuates all three spindles in their proper sequence: starting at the left, this one rough drills; the second semifinish drills; the third one reams. These spindles can be collectively or individually controlled to do all sorts of things, even tapping.

The machine is thoroughly universal and regardless of the bolt circle (within the machine's limitations), or the number of holes, we can drill the parts well within tolerances of plus or minus .005 inches. With unusual care in setting up we can hold this tolerance to plus or minus .001 inches. In some instances, where the requirements are extremely accurate, we mount a drill jig over the part, then proceed to use the machine in its conventional manner. Ninety per cent of our work can be done well within tolerances by using the drill bushings as shown in the photograph.



"Great work, Al! Too bad you're not in the sales department so we could get a raise through for you."

The three heads are adjustable radially around the base. They are also adjustable in and out. The machine can be set up in a reasonable length of time to drill any radius, or any combination of holes, from 18" to 48" in diameter.

In the lower part of the table, and to the right of the shot bolt bracket, you will see some adjustable stops, see insert in the photograph. These, when needed, can be used for operating limit switches on one or all of the spindles when it is desired to cease operation of a particular spindle for one or more holes. For example, suppose a spindle is to drill all holes in a part except one. When it comes to that place in the index this stop cuts the spindle out while the others do their work.

We have a large number of these machines. Each one is set up with a different ring enabling us to get various combinations of holes without changing

the index rings. When it is necessary to change an index ring it is easily done by removing a few screws and lifting the ring off the locating surface at the base of the table.

This machine is ideally suited for performing operations on the great variety of large circular pieces which constitute a gas turbine engine. It materially cuts down our tool expense because we no longer have to make large and expensive jigs which are clumsy to use. Another advantage is this: when we see that a drill needs sharpening, only a moment is lost in changing the drill before we're in business again.

A large number of our holes are drilled, reamed and/or countersunk. Think what it would mean to have a multiple spindle drill for the many holes patterns and combinations used in gas turbine engines. The capital investment would be out of proportion to the quantity of parts to be made.

The End

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The three photos at right illustrate the flexibility of 12-position indexing, whereby each tool may be used in three different working positions.

- ✓ Accurate within .0005.
- ✓ 12 position indexing.
- ✓ Hardened steel construction.
- ✓ Mounts rigidly in compound T-slot.
- ✓ Keeps setting accurately.
- ✓ Indexing is self-contained — eliminates all chip-interference.

¾" square tool bit mounted in Model 4½-S turret used for facing cut.

The same tool used for broodface turning merely by indexing turret 1 position or 30°.

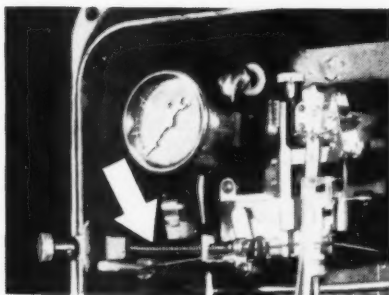
Same tool used for inside chamfer merely by indexing back 2 positions or 60°.



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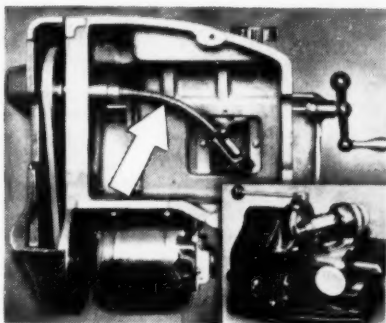


REMOTE CONTROL

By using a short length of flexible shaft to couple an interior operating mechanism to its control knob, the manufacturer of this device eliminated alignment problems and reduced assembly time and costs.

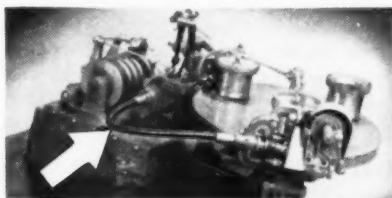
POWER DRIVE

An S.S.White flexible shaft drive for the valve holder of this valve grinding machine enables the valve holder to be set in different operating positions. The simplicity of the arrangement means fewer parts, easier assembly, reduced production time and costs.



POWER DRIVE

By using an S.S.White flexible shaft to bring power around a turn from one part of the unit to another, the manufacturer of this machine eliminated a lot of unnecessary parts which would require extra handling and care in assembly.



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CUTS COSTS 3 WAYS

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Only the speed of the operator limits the 912's riveting speed. Completely automatic. A push on foot pedal automatically feeds, inserts and clinches the rivet.

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The 912 is massively built to stand the shocks of constant use and is designed for quick, easy servicing and parts replacement.

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contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.



Chicago Rivet & MACHINE CO.

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Branch Factory: Tyrone, Pa.



An Interesting Boring Fixture

by Robert Mawson

IN ORDER to produce precise interchangeable parts the machine tool on which these jobs are performed should also be precision built. A machine tool which has poorly fitted ways or loose spindle bearings can scarcely be expected to produce accurately machined parts. To meet this need for a well-built product the modern machine tool manufacturer uses special tools, jigs, fixtures, and the like, to obtain the several details used in the construction of his product.

When machining the swivel head, made of cast iron, which is one detail used on the machine tools manufactured by the Covell Mfg. Co., Benton Harbor, Mich., the following is the sequence of operations:

1. No. 5 Warner & Swasey turret lathe; turn and face a $3\frac{1}{2}$ in. flange, turn $1\frac{1}{2}$ in. pilot, drill and tap $\frac{1}{2}$ -13 hole.

2. No. 3H K & T mill: mill two $3\frac{7}{8}$

in. side pads and one $3\frac{7}{8}$ in. top pad. Two side milling cutters and one plain milling cutter used on the milling machine arbor.

3. No. 2H K & T mill: mill $1\frac{3}{8}$ in. angular pad.

4. Precision boring mill: rough and finish bores and face.

5. Drill and tap several small holes.

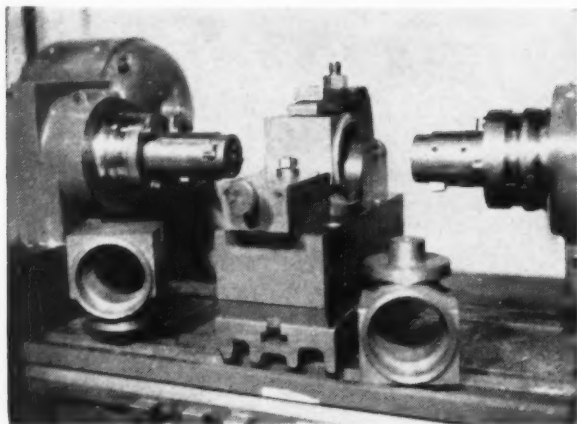
6. Warner & Swasey turret lathe: machine $3\text{-}13/32$ by $\frac{1}{8}$ in. undercut in bore.

7. Graduating machine: machine graduations.

8. Stamp.

In operation 4 the holes to be machined with the left-hand tools are 3.150 in. by $1\text{-}3/16$ in. deep and $2\frac{3}{4}$ in. by $1\frac{1}{2}$ in. deep. The right-hand tools bore a 3.150 in. by one inch deep. Both ends of the casting are also faced to a total width of $3\text{-}11/16$ in. The tool setup is illustrated in figure 1.

This work was first performed on a



1. Showing the swivel head and the fixture, as well as the boring heads. With this fixture the holes are bored in line, the shoulders in the holes are square and the ends of the casting are in alignment with the bored holes.

horizontal boring machine. However, this method was found to be unsatisfactory because the holes had to be line reamed after the workpiece came from the machine in order to obtain the correct size and squareness of the two shoulders of the 3.150 in. holes.

This boring operation is now being done on a double head precision boring machine as shown in the illustration. The workpiece is located by the 1½ in. stem placed in a hole machined in the fixture base. This hole is a good sliding fit for the turned pilot, or stem, of the workpiece. The casting is positioned, at the rear, with a machine steel, case hardened plate which reaches the full width of the workpiece. A knurled head screw in the front of the fixture, when screwed into the fixture, moves a machine steel, hardened plate to contact the front surface of the swivel head. A strap is then tightened on the top of the workpiece to hold it securely for the machining operations.

As this job is scheduled on a production basis the castings are sent through in lots of 100 to 200 at a time. With the workpiece located and held as described the two roughing cutter bars are fastened in their respective machine heads. The two travel stops are adjusted and then fastened on the

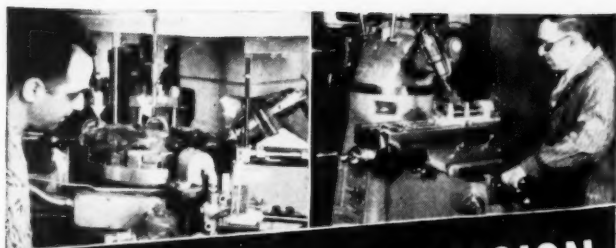
machine to give the correct length of travel.

The operator now presses the starting button and the machine goes through its cycle: first, to the right to rough bore the two holes and face the end, then rapid traverse to the left when the other hole is bored and the opposite end of the casting is faced. The setups and machining operations are repeated until all the pieces on the job lot have been rough bored. These roughing tools leave approximately .010 to .020 in. per side on all diameters for the finishing operations.

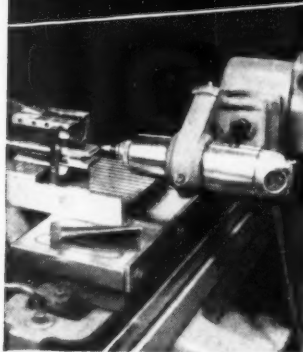
The rough boring bars are then removed from the machine and substituted with the finishing boring bars. For the finishing operation the workpiece is located and held in a similar manner as described and the holes and faces are finished to their respective dimensions.

To remove the finish machined workpiece it is only necessary to screw back the clamp nut and take away the clamp from the upper surface of the piece, release the pressure on the workpiece by screwing back the knurled head screw on the forward end of the fixture, and the swivel head can be lifted out of the fixture.

With this fixture and method, as



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illustrated, the holes are bored in line, the shoulders in the holes are square, and the ends of the casting are in alignment with the bored holes. What is equally important from a manufacturing viewpoint is that the operation is performed in about 25 per cent of the time required by the previous method, thus demonstrating an efficient production procedure.

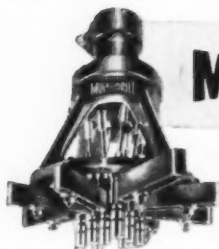
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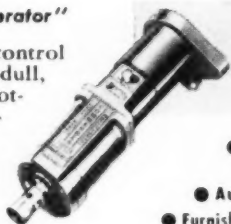
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Grinder Gives Camera Manufacturer Low Cost Precision

PRECISION is a necessity in the manufacture of cameras, but obtaining it can often be slow and expensive. A moderate priced grinder has been one solution to volume precision for the David White Co., Milwaukee, manufacturer of the famous three dimensional Stereo Realist camera.

Formerly, die cast aluminum camera parts were rough ground and then milled down .020" before a final grinding operation removed the last .002"—

.003" of metal. The milling operation proved slow and, due to the heat it produced, caused distortion in the metal.

David White production men analyzed the problem and came up with a low cost answer. It was a Besly 18" single spindle wet grinder, model 205, which removed all excess metal with such close accuracy that the milling operation was eliminated entirely. Under the new, shorter method, production

1. Grinding camera bodies at the David White Co., Milwaukee, where 100 camera parts per hour are accurately ground on five surfaces with this grinder.





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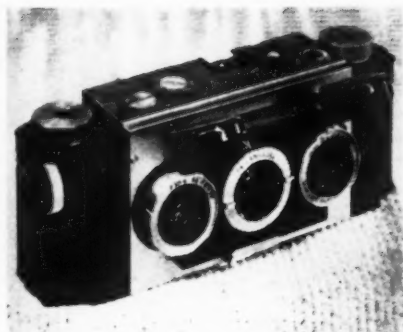
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2. Lens boards, bodies and top covers for the Stereo Realist are now ground in one operation instead of three operations of snagging, milling, and finish grinding. Result—more parts are produced per hour more accurately.

has trebled and a better finish on the camera parts is obtained. Because the work remains cool compared to the milling method, there is no distortion in the metal. Abrasive costs have also been reduced by the elimination of a felt sanding operation.

The company obtains the following accuracy with its Besly grinder: flatness within .001", parallelism within .001", size within .002" and surface finish of 20-25 micro inch. A number C 80-L-12 resinoid bonded, open structure wheel is used on the grinder and gives an average life of 4 months.

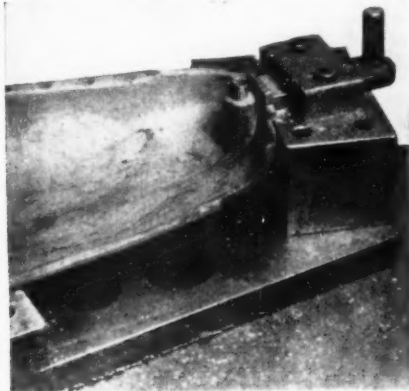
Wire inserts form strong threads

In converting the side covers of their calculating machine from aluminum to magnesium castings, the engineers of Marchant Calculating Machine Co., Oakland, Calif., reduced the weight of their design. But to accomplish this change they had to offset a limiting physical characteristic of the magnesium—its low tapped thread strength.

Required strength in the metal was obtained by installing Heli-Coil thread inserts into the prepared thread bosses of the cast side covers. Three inserts are used in each cover, forming 5/16-18

internal threads 5/16 in. long.

The inserts, helical coils of diamond-shaped stainless steel wire, serve three purposes. First, they provide internal



threads having a tensile strength up to 50 percent greater than is possible in the magnesium alone. This added strength permits the calculator to be

lifted and carried from place to place without danger of stripping the threads in the castings and pulling side covers from the machine. Secondly, the tight-fitting stainless steel inserts prevent the electrolytic action that would result in corrosion if standard steel threaded fasteners came in direct contact with the magnesium. Thirdly, should the side plates ever need removal for servicing the inner parts of the machine, there is no risk of damage to the protected tapped threads, since the inserts are harder and tougher than any machine screw.

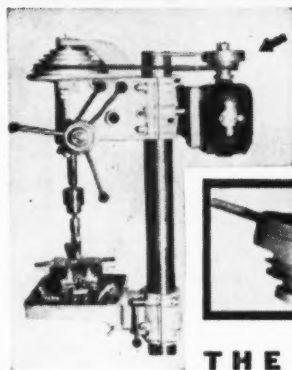
No increase in assembly time was reported as a result of using the thread inserts. This may result from the fact that the inserts prevent possible stripping and cross threading in soft metal parts during assembly.

Four breech block guide faces finished in one broaching operation

The inherent high accuracy and surface finish that can be achieved with

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1/2" - 3/8" - 3/4"



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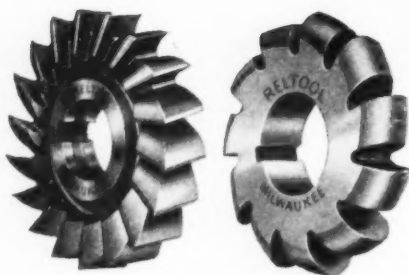
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A-5947-1/2 R

the broaching operation has led to the specification of this process to size and finish the guide faces on breech blocks for a military weapon. In the operation about 0.032" of stock is removed from each of four breech block guide faces.

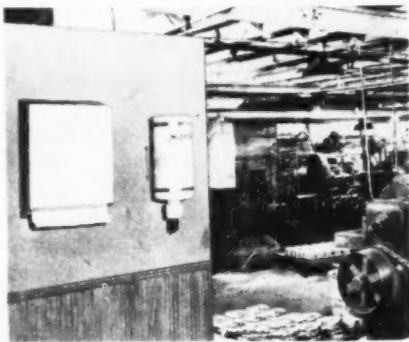
The machine on which this operation is performed is a Colonial 25-ton, 66-in. stroke single ram broaching machine, equipped with two sets of broaches that simultaneously straddle-face the four surfaces on the alloy steel forged breech block.

The part is held in the fixture by a swinging bar-type clamp that is locked in position after the part has been lowered into the fixture with the fixture in the retracted position for loading. Tolerance for the 6.084-in. width dimension is plus 0.000, minus 0.002-inch.

30-second hand cleaning cuts time losses

Wayne Home Equipment Co., Inc., reports increased productivity in their oil burner parts-machining department because of "hand-care stations" installed near production equipment.

Each "station" consists of a gallon or quart dispenser of Hammons water-



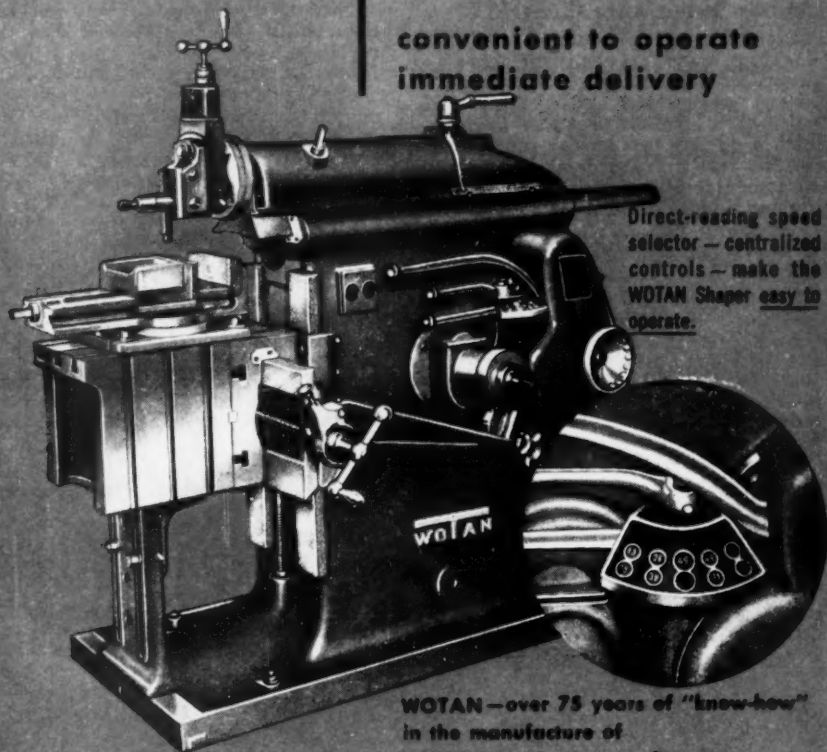
less hand soap and a wall cabinet of paper towels. No water is used in cleaning the hands, so the installations are located as required. This eliminates washroom congestion and cuts time loss away from the machines.

According to reports from other industrial users, plant workers benefit with improved skin condition resulting from the lanolin and glycerin content

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Carbide tooling affords increased tool life on severe interrupted cuts

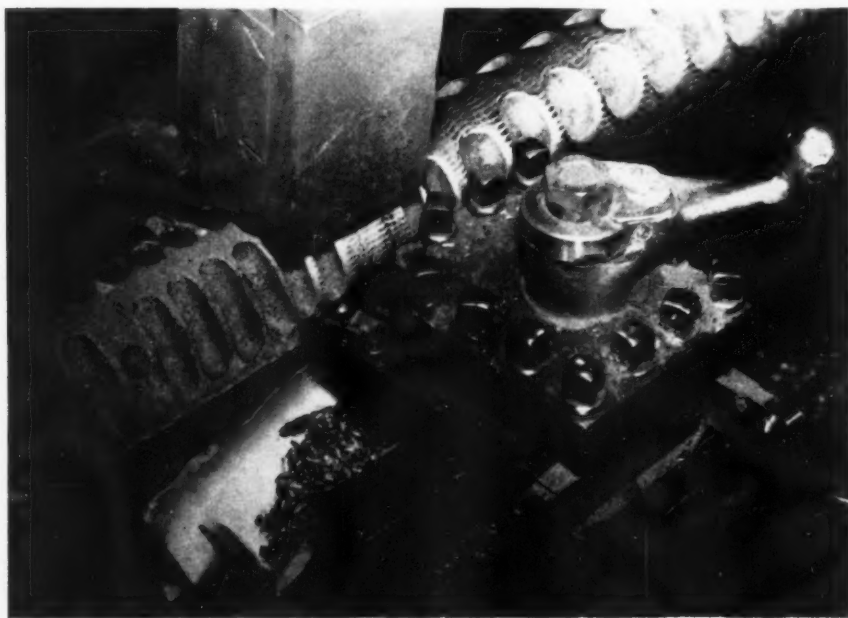
Increased tool life up to 1150% is enabling many operators to show reduced machining costs in instances of severe interrupted cutting. An agricultural equipment producer overcame such a cutting problem in rough turning his cast iron cornhusker rolls with Kennametal K-6 clamped-on tip cemented tungsten carbide tools on a 10 horsepower lathe. These rolls which contain many hard spots and sandy inclusions have numerous grooves on their long slender bodies which present unusually severe interrupted cutting conditions.

Terrific pounding set up by these interruptions causes the 3 $\frac{3}{4}$ " dia. by 64" long rolls to vibrate and bounce on a degree that the cross slide feed handle has to be fastened down with a "C"

clamp to prevent creepage. A roller steady rest was attached to the cross slide to support the workpiece. However, this helped very little since it bounced along with the cross slide at each interruption.

Initially this operation was run with high speed steel tools which required regrinding after turning only 3 pieces. In an attempt to reduce frequent tool changes and increase production, Kennametal cemented tungsten carbide tools were applied to the job. Despite the severe operating conditions, the tools turned 350 pieces before any regrinding was required, representing 115 times greater tool life.

After changing to cemented tungsten carbide tools, revolutions and s.f.p.m. were doubled to 80 and 78.5 respectively. Feed was increased from 0.030" to 0.044" with depth of cut remaining the same at $\frac{1}{8}$ " to $\frac{1}{4}$ ". Turning time per piece was reduced from 39 to 15 min. and 16 pieces produced per 8 hr. shift as compared to 11 for the high speed steel tooling setup.



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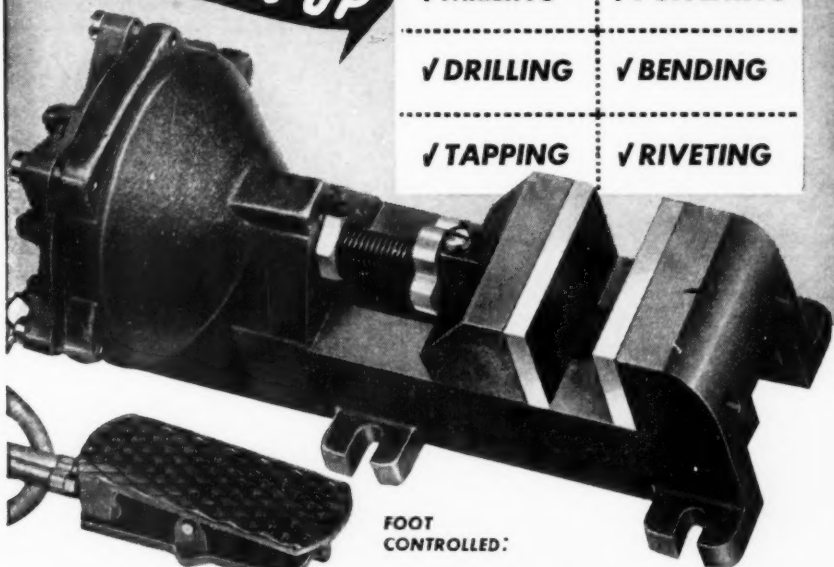
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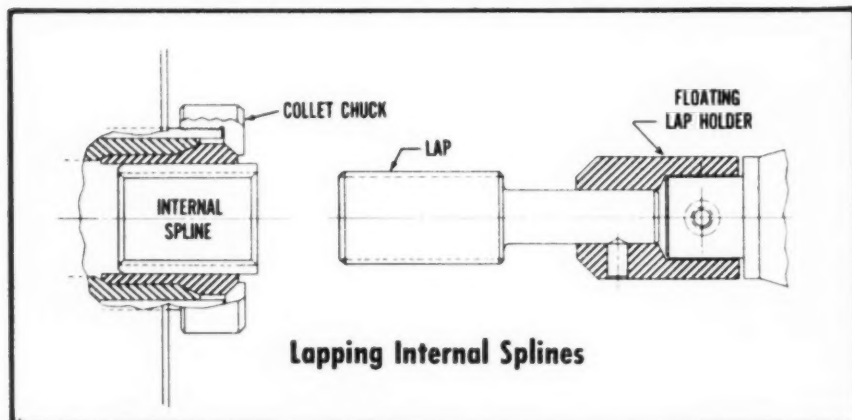
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Method for lapping small internal and non rolling spline and gear forms

A new method for lapping small internal splines and non-rolling external splines and gear forms has been developed by Michigan Tool Co., 7171 E. McNichols Road, Detroit 12, Mich. The method, which can be applied to either

the Michigan Model 996 or Model 998 internal gear lapper, permits production lapping of external splines that are of insufficient depth to allow continuous rolling contact with a lap in conventional external lapping machines, as

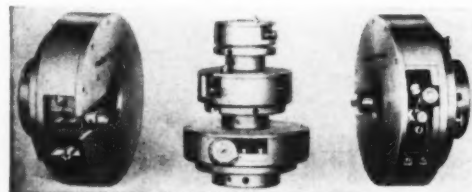


well as production lapping of internal splines so small that it is impractical to make a lap that will roll with the spline.

For lapping the external splines, parts are chucked in an internal lapping machine. An internal toothed lap having the same number of teeth as the spline is mounted in a floating holder on the reciprocating lap spindle. The lap is made with sufficient clearance to slide over the spline.

In operation, the work drives the lap and the lap spindle reciprocates on the work centerline while the work and lap rotate together. The lap spindle is braked hydraulically to give lapping action to one side of the splines. The work is rotated in the opposite direction to lap the opposite side of the splines.

For lapping internal splines, a similar arrangement is used with the internal splined member in the chuck and the external splined member



MUMMERT-DIXON FACING HEADS with Automatic Feed

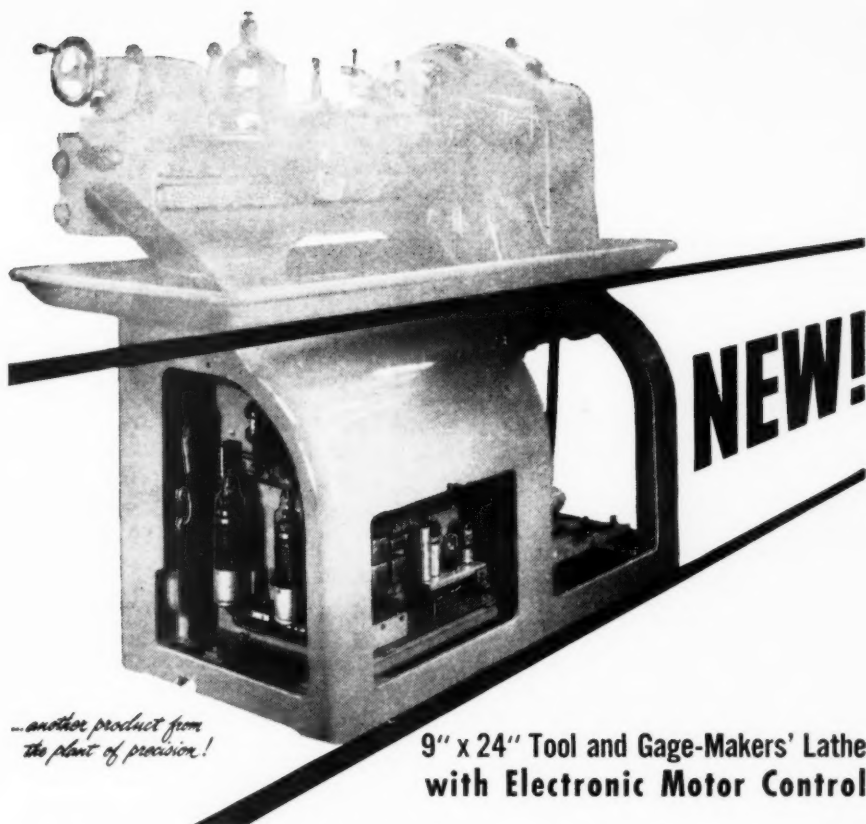
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MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.

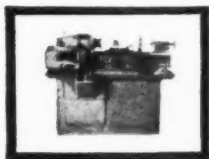


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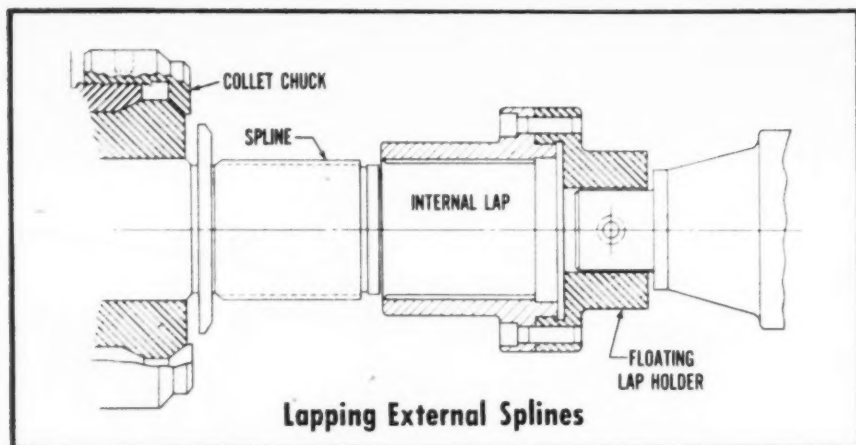
maximum speed is accomplished in approximately 1½ seconds. Starting, stopping or reversing, even at 3000 R.P.M., is accomplished smoothly and rapidly. This new drive is optional equipment, and full information is available in our new 9" x 24" Lathe catalog. Write for your free copy! It gives full details on the new drive as well as other features of the Hendey 9" x 24" Lathe, which guarantee precision output with minimum effort.



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Dealers in Principal Cities





Lapping External Splines

mounted on the lap spindle with a floating holder. Splines as small as 1" dia. pitch can be lapped this way.

The method is being successfully ap-

plied in instrument, aircraft and other applications where heat treatment distortions are a problem on precision parts.

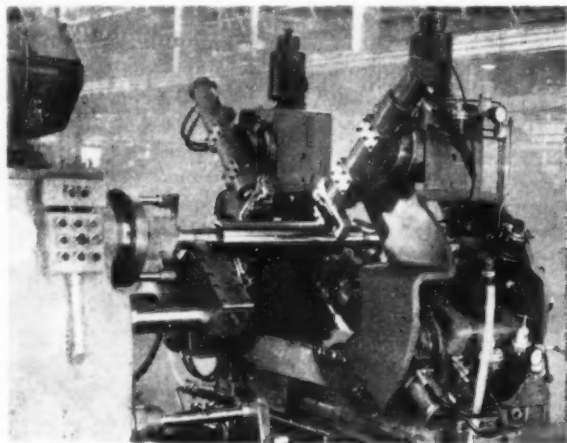
Superfinishing mill rolls lengthens life

Maintenance of mill rolls is a never-ending problem. A well-known rolling mill, which produces stainless steel strip stock, decided to make some tests. The objective was two-fold. First, they wanted to extend the working life of the individual mill rolls. Secondly, they

wanted to reduce the time and expense of refinishing the rolls. Special arrangements for this test were made with Gisholt Machine Co.

Test rolls were shipped to Madison, Wis., to be superfinished. These were then returned to the mill. In produc-

Close-up shows four superfinishing heads with bearing support and driving adapter. Stones oscillate and traverse to scrub away amorphous metal.



This man is running **SIX** *drill presses*

He is performing six consecutive drilling operations with a single jig at a single working station, with less handling time, and without changing tools. He is using the Lign-o-matic turret on a standard drill press.



PUT THE LIGN-O-MATIC TURRET IN YOUR SHOP FOR A FREE 10-DAY TRIAL... IT WILL...

INCREASE PRODUCTION — Many users report more than 300% greater output in actual production. Turret indexes faster than tools can be changed or work moved to another spindle.

CUT COSTS — patented self-centering principle guarantees accuracy equal to drill press spindle. Lign-o-matic

reduces tool and jig wear, cuts worker fatigue: adds up to faster work with fewer rejects. All parts completely guaranteed for **TWO YEARS** against defective manufacture.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper \$235.00.

DELIVERY — Currently, 2 weeks.

TRY IT YOURSELF at our expense. If you are not fully satisfied for *any* reason, return turret within 10 days and pay nothing.



HOWE & FANT, INC.

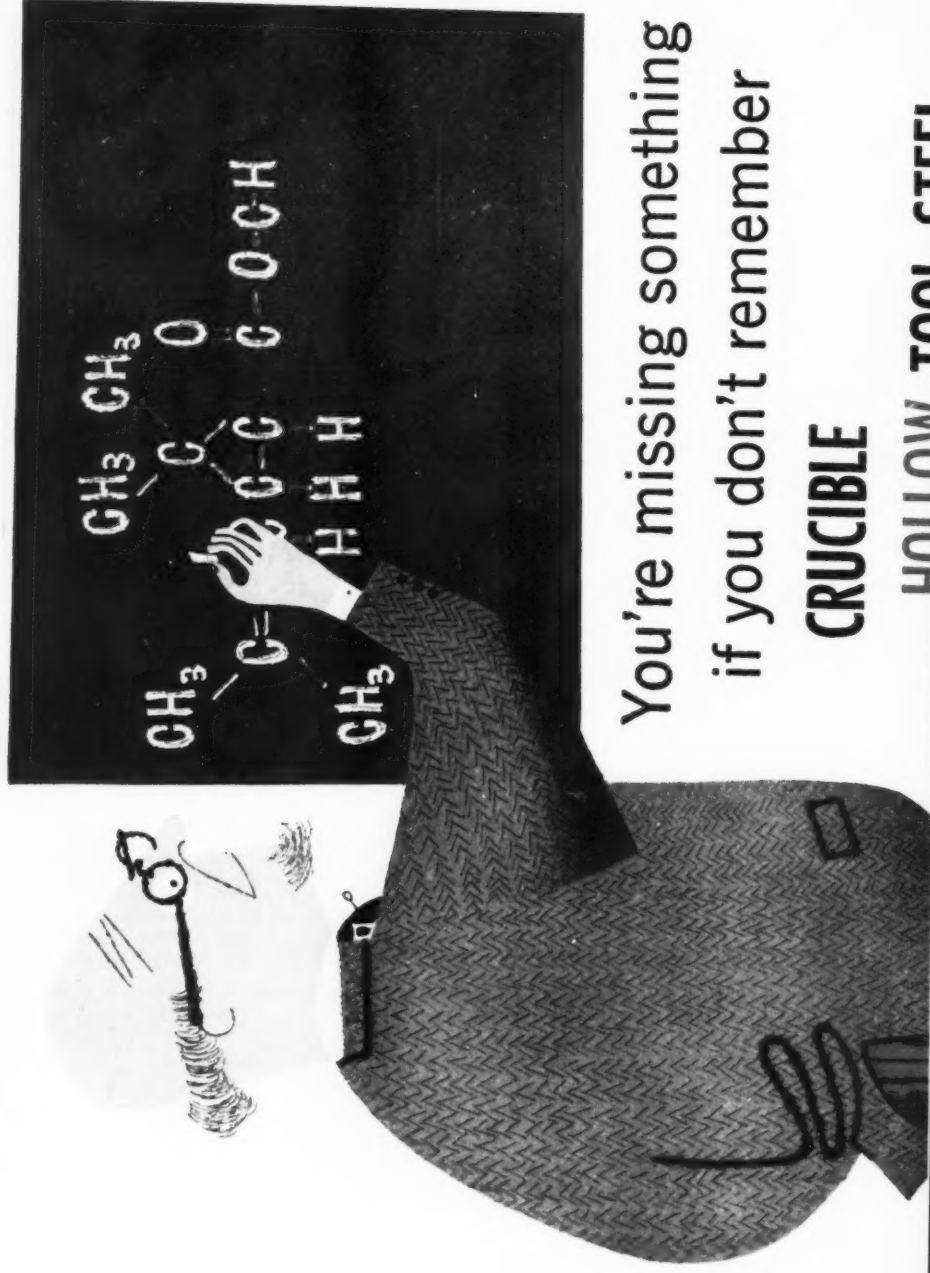
**539 FLAXHILL ROAD
SO. NORWALK, CONN.**

- ☐ Please rush Lign-o-matic turrets for (drill press make) (size) (quill dia.) (spindle taper)
- ☐ Please send bulletin with complete information.

MY NAME

TITLE

(Attach coupon to company letterhead)



You're missing something
if you don't remember

CRUCIBLE

HOLLOW TOWN STEEL

If you manufacture tool steel parts with cutout centers, and your aim is to reduce production time and costs, you can't afford to overlook Crucible Hollow Tool Steel. It comes in three famous grades: KETOS, AIRDI 150 and SANDERSON.

You don't have to drill and bore solid bars anymore. For these quality brands of tool steel are immediately available with machine-finished inside and outside diameters and faces — cut to your specific length requirements. And they come in a wide range of sizes.

By eliminating drilling and boring operations, Crucible Hollow Tool Steel will lower your production time per unit ... increase your machine capacity ... and reduce your scrap losses.

For full information and literature, call your nearest Crucible warehouse ... or write for new brochure describing Crucible Hollow Tool Steel. Address Dept. MB, Crucible Steel Company of America, Chrysler Building, New York, N. Y.


CRUCIBLE

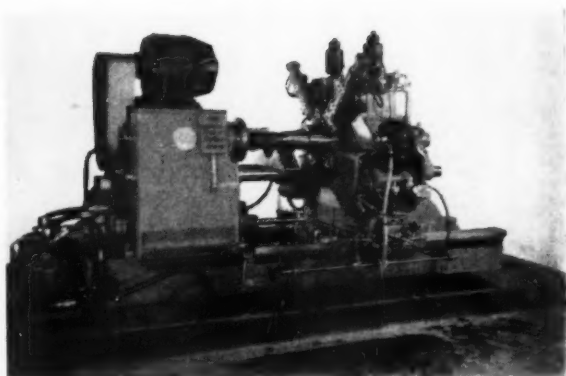
first name in special purpose steels

53 years of *Fine steelmaking*

HOLLOW TOOL STEEL

CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.

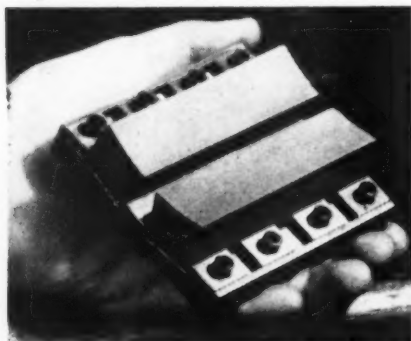
Gisholt Model 78 mill roll superfinisher will superfinish mill roll in 15 minutes or less. Operation is completely automatic and machine will handle 60" between centers, with 36" roll having 20" diameter.



tion it was found that one set of superfinished rolls ran 36 machine hours, as against less than eight hours for a similar set of ground rolls. In another test it was found that superfinished rolls would handle 280,000 lbs. before refinishing, as against less than 100,000 lbs. with ground rolls. In a salt spray test it showed there were less iron inclusions in the stainless steel rolled strip when the mill roll had been superfinished.

Based on these tests a Model 78 mill roll superfinisher was ordered and is now in use in this plant. The machine has a completely automatic cycle and

Each of four superfinishing heads carries this quick-change stoneholder. The stones are vitrified bonded abrasive. Note that each stone is dressed to the work radius to give an area rather than a line contact.

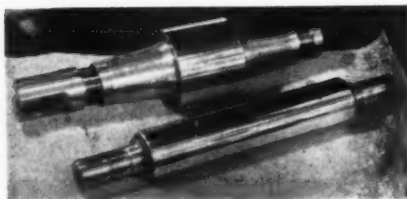


is adjustable to handle a wide variety of mill rolls up to a 20" diameter and 36" roll working surface. Rolls with a single or double crown measuring from .001" to .007" are also handled on this machine.

The cycle starts with the operator loading the roll into the machine. The roll is driven with a special adapter, is supported with a tailstock, and rests on its own bearings. As the roll is driven, the superfinishing stones contact the work and are oscillated and traversed back and forth over the length of the roll. Three automatic changes of spindle speed give roughing, semi-finishing and finishing operations. At the completion of the cycle the spindle brake is applied, the roll is wrapped to protect the superfinished surface and is then removed from the machine.

Additional tests are now being carried on at the mill. The complete super-

Two of many sizes of rolls used in rolling stainless steel strip sheet. Surface roughness of superfinished roll measures maximum of 1 micro-inch rms.



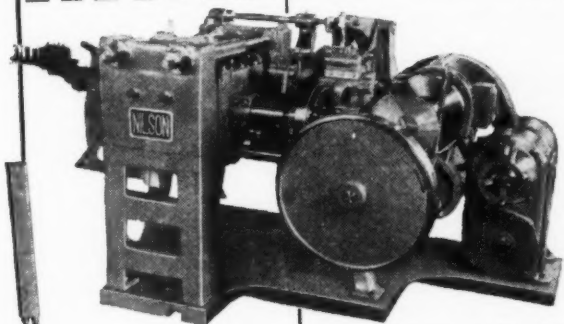
FORMING FACTS

**72% SAVING
IN METAL!
80% INCREASE
IN PRODUCTION!**
UNIQUE BALANCE CO. INC.

*Typical results
by every user of*

NILSON 4-SLIDE

**Wire and Ribbon Metal
FORMING MACHINES**



Plants from coast-to-coast are setting new production records with NILSON 4-SLIDE MACHINES . . . and experiencing tremendous economies and greatly improved quality.

USING A NILSON COMBINATION PRESS AND 4-SLIDE FORMING MACHINE

Unique Balance Co., Inc. (one of the largest manufacturers of sash balance equipment), now produces 71,532 more parts out of the same amount of steel, compared to their former method. Production speeds increased from 100 to 180 pieces per minute.

Are you confronted with a keen competitive situation? Take the advice of hundreds of plant supervisors . . . install NILSON MACHINES and enjoy these economies **at once**.

NILSON combination press and 4-SLIDE forming machines take the stock directly from the coil — feed, straighten, pierce, blank, swage, stamp, coin — perform up to 5 forming operations and cut off . . . all in one quick, precise operation **AUTOMATICALLY!**

THERE'S NOTHING LIKE A
NILSON

For specific recommendations, send prints or samples of your operation when requesting bulletin.

THE A. H. NILSON MACHINE CO.
1511 Railroad Ave., Bridgeport, Conn.

Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and Stock Reels • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses

finishing operation is taking a maximum of 15 minutes, depending on the size of the roll. Tests on stones are giving a resultant surface roughness of

1 micro-inch rms. or less. Life of the superfinished roll has generally been found to be three times the life of ground rolls.

Welded frame and air cylinder eliminate expensive loading ramp

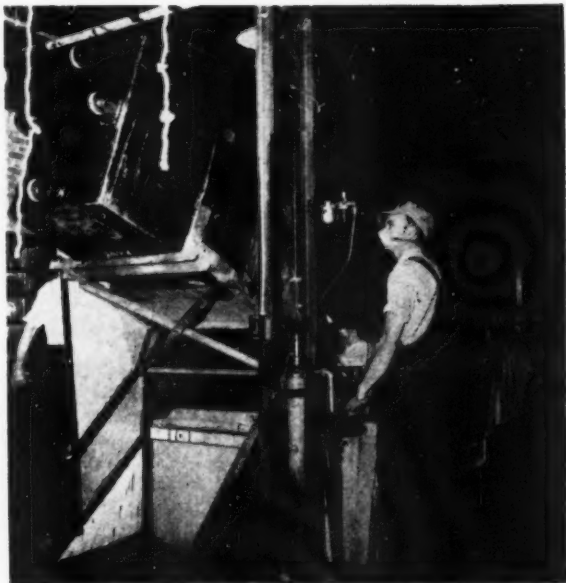
In many plants, wastes such as paper, sawdust, etc., are collected with hand carts, which are, in turn, emptied into packer trucks. Conventional procedure is to have these carts wheeled out onto a loading platform and dumped into the waiting trucks.

At the Burroughs Adding Machine Co., Detroit, Mich., this procedure has been changed and subsequently the need for construction of an expensive loading platform eliminated.

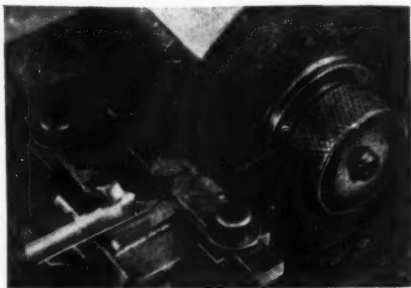
A sleeve has been welded on each side of the waste cart. A welded structure has been erected on the plant floor. Two arms of this welded structure slip into the sleeves of the cart which is guided into place in the stable-like entry. A double-acting air cylinder acts on a cable which passes over a pulley and is so attached as to upend the cart when the cylinder stroke is down. On the return stroke,

the cart is returned gently to the floor.

This simple air-actuated device might conceivably be adapted to other materials handling problems facing plant engineers.



The thinnest Norton grinding wheel and one of the smallest made is this 3½" diameter rubber bonded wheel used to slit the nibs of pen points. This wheel is only 6 thousandths of an inch thick, twice the width of a human hair. The abrasive used is regular Alundum, the grit size 240. This particular slitting machine is one used by the Esterbrook Pen Co., Camden, N. J. The company has been making pens since 1858.





For **CIMCOOL** covers 85% of all metal cutting jobs!

● CIMCOOL® leads the league because it's a radically new and different cutting fluid that replaces all water emulsions and all but a few highly compounded specialty oils.

● Cimcool scores over old-fashioned coolants because it's a *chemical emulsion*. It permits faster speeds and increases tool life because Cimcool combines friction reduction and cooling capacity in a degree never before attained. It's longer lasting in machines, too. So Cimcool reduces downtime and cuts labor costs for cleaning and changing.

● For a demonstration of how CIMCOOL can improve your production batting-average, just write us. We'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet, "Cimcool Defeats Heat." Address Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

®TradeMark Reg. U.S. Pat. Off.


for

85%

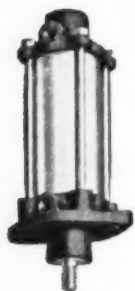
OF ALL METAL CUTTING JOBS



Log-Edger Feed-Rolls lifted by NOPAK Cylinder

controlled by

NOPAK 3-Way Air Valve



NOPAK Model "D"
Air Cylinder for Right
Angle Flat Base
Mounting, Rod End.

This Pacific Coast type log edger, manufactured by Albany Machine & Supply Co., Albany, Ore., employs an 8" NOPAK Model "D" Single Acting Air-Cylinder to lift the heavy feed-rolls by means of lever arms. This permits feeding of various sized cants as required. The cylinder is actuated by a 3/4" NOPAK, 3-Way Air Valve, equipped with lever extension-bar enabling the operator to manipulate it from any point in front of the machine. Weighted valve lever, when released, lowers rolls to "feed" position. Springs prevent feed rolls from dropping full length of cylinder stroke when machine is "empty."

This comparatively simple application may suggest how you can employ NOPAK Valves and Cylinders in your plant or product to actuate and control machine movements.

GALLAND-HENNING NOPAK DIVISION
2754 S. 31st STREET • MILWAUKEE 46, WISCONSIN

Refer to Sweet's File for
Product Designers or write
for Bulletin SW-1

Representatives in Principal
Cities

NOPAK

VALVES AND CYLINDERS

DESIGNED for AIR and HYDRAULIC SERVICE

BLUE BOOK'S Know How Reference Sheets

Grinding Wheel Speeds

Table of Speeds

Revolutions per minute for various diameters of grinding wheels to give peripheral speed in feet per minute as indicated.

| Dia. of Wheel in Inches | PERIPHERAL SPEED IN FEET PER MINUTE | | | | | | | |
|----------------------------|-------------------------------------|----------|----------|--------|----------|----------|--------|----------|
| | 4,000 | 4,500 | 5,000 | 5,500 | 6,000 | 6,500 | 7,000 | 7,500 |
| | Revolu | tions pe | r Minute | Revolu | tions pe | r Minute | Revolu | tions pe |
| | | | | | | | | |
| 1 | 15,279 | 17,189 | 19,098 | 21,008 | 22,918 | 24,828 | 26,737 | 28,647 |
| 2 | 7,639 | 8,594 | 9,549 | 10,504 | 11,459 | 12,414 | 13,368 | 14,328 |
| 3 | 5,093 | 5,729 | 6,366 | 7,003 | 7,639 | 8,276 | 8,913 | 9,549 |
| 4 | 3,820 | 4,297 | 4,775 | 5,252 | 5,729 | 6,207 | 6,685 | 7,162 |
| 5 | 3,056 | 3,438 | 3,820 | 4,202 | 4,584 | 4,966 | 5,348 | 5,730 |
| 6 | 2,546 | 2,865 | 3,183 | 3,501 | 3,820 | 4,138 | 4,456 | 4,775 |
| 7 | 2,183 | 2,455 | 2,728 | 3,001 | 3,274 | 3,547 | 3,820 | 4,092 |
| 8 | 1,910 | 2,148 | 2,387 | 2,626 | 2,865 | 3,103 | 3,342 | 3,580 |
| 10 | 1,528 | 1,719 | 1,910 | 2,101 | 2,292 | 2,483 | 2,674 | 2,865 |
| 12 | 1,273 | 1,432 | 1,591 | 1,751 | 1,910 | 2,069 | 2,228 | 2,386 |
| 14 | 1,091 | 1,228 | 1,364 | 1,500 | 1,637 | 1,773 | 1,910 | 2,046 |
| 16 | 955 | 1,074 | 1,164 | 1,313 | 1,432 | 1,552 | 1,672 | 1,791 |
| 18 | 849 | 955 | 1,061 | 1,167 | 1,273 | 1,379 | 1,485 | 1,591 |
| 20 | 764 | 859 | 955 | 1,050 | 1,146 | 1,241 | 1,337 | 1,432 |
| 22 | 694 | 781 | 868 | 955 | 1,042 | 1,128 | 1,215 | 1,302 |
| 24 | 637 | 716 | 796 | 875 | 955 | 1,034 | 1,115 | 1,194 |
| 26 | 588 | 661 | 734 | 808 | 881 | 955 | 1,028 | 1,101 |
| 28 | 546 | 614 | 682 | 750 | 818 | 887 | 955 | 1,023 |
| 30 | 509 | 573 | 637 | 700 | 764 | 828 | 891 | 955 |
| 32 | 477 | 537 | 597 | 656 | 716 | 776 | 836 | 895 |
| 34 | 449 | 505 | 562 | 618 | 674 | 730 | 786 | 843 |
| 36 | 424 | 477 | 530 | 583 | 637 | 690 | 742 | 795 |
| 38 | 402 | 452 | 503 | 553 | 603 | 653 | 704 | 754 |
| 40 | 382 | 430 | 478 | 525 | 573 | 620 | 669 | 716 |
| 42 | 366 | 409 | 454 | 500 | 545 | 591 | 636 | 682 |
| 44 | 347 | 390 | 434 | 478 | 521 | 564 | 608 | 651 |
| 46 | 333 | 375 | 416 | 458 | 500 | 541 | 582 | 624 |
| 48 | 318 | 358 | 398 | 438 | 478 | 517 | 558 | 597 |
| 53 | 288 | 324 | 360 | 395 | 432 | 468 | 503 | 539 |
| 60 | 255 | 287 | 319 | 350 | 387 | 414 | 446 | 478 |
| 72 | 212 | 239 | 265 | 291 | 318 | 345 | 371 | 398 |

To find the peripheral speed of a wheel in feet per minute (s.f.p.m.), multiply the circumference in feet by the wheel revolutions per minute.

Diameter in inches x 3.14 x r.p.m.

S.F.P.M. of wheel =

Lodge & Shipley 60" **T*** lathes

in 6 distinctive models

Further advances in the art of "T-Turning"—
brought to you by the originators of the T Lathe

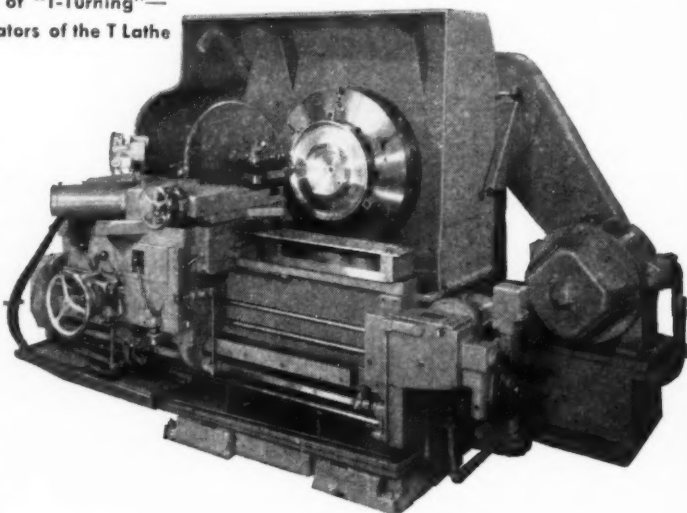
These latest Lodge & Shipley **T** Lathes offer greater speed, accuracy and ease of machining.

These lathes have one or two carriages, either or both of which may be COPYMATIC controlled for automatic contour turning, facing and boring of short, thin-walled section work of large diameter.

The **T** Lathe costs less than conventional machines, saves floor space, obsoletes the use of large cumbersome engine and raised lathes for this type of work.

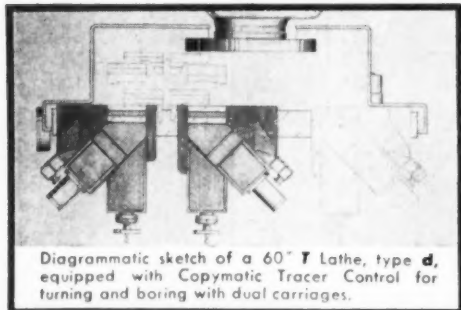
Write for new **T** Lathe literature.

* T. M. The Lodge & Shipley Co.



60" **T** Lathe, type **b-1**, single carriage;
COPYMATIC "Cross-Center" Facing Carriage.

Choose a Lodge & Shipley **T** Lathe designed
for short, thin wall large diameter work



Diagrammatic sketch of a 60" **T** Lathe, type **d**,
equipped with Copymatic Tracer Control for
turning and boring with dual carriages.

Type **a-1** for straight and angular facing, turning, boring

Type **b-1** for contour facing on both sides of center . . . limited contour turning and boring

Type **d** for contour turning, boring; straight facing and limited contour facing

Type **e** for contour turning; straight and angular facing, turning, boring

Type **j** for straight and angular facing, turning, boring

Type **n** for straight and angular facing, turning, boring and contour boring

THE **Lodge & Shipley**
COMPANY

3055 COLERAIN
CINCINNATI 25, OHIO

BLUE BOOK'S Know How Reference Sheets

Table of Speeds—Continued

Note: "Centrifugal Force," which is the force that tends to rupture a given wheel when overspeeding, increases as the square of the velocity of that wheel. For example: the centrifugal force in a wheel running at 5500 s.f.p.m. is 49% greater than in the same wheel running 4500 s.f.p.m., although the speed is actually only 25% greater.

| PERIPHERAL SPEED IN FEET PER MINUTE | | | | | | | | Dia. of Wheel in Inches |
|-------------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------------|
| 8,000 | 8,500 | 9,000 | 9,500 | 10,000 | 12,000 | 14,000 | 16,000 | |
| Revolutions per Minute | Revolutions per Minute | Revolutions per Minute | Revolutions per Minute | Revolutions per Minute | Revolutions per Minute | Revolutions per Minute | Revolutions per Minute | |
| 30,558 | 32,467 | 34,377 | 36,287 | 38,196 | 45,836 | 53,474 | 61,116 | 1 |
| 15,278 | 16,238 | 17,188 | 18,143 | 19,098 | 22,918 | 26,737 | 30,558 | 2 |
| 10,186 | 10,822 | 11,459 | 12,115 | 12,732 | 15,278 | 17,826 | 20,372 | 3 |
| 7,640 | 8,116 | 8,595 | 9,072 | 9,549 | 11,459 | 13,368 | 15,278 | 4 |
| 6,112 | 6,494 | 6,876 | 7,258 | 7,640 | 9,168 | 10,696 | 12,224 | 5 |
| 5,092 | 5,411 | 5,729 | 6,048 | 6,366 | 7,639 | 8,913 | 10,186 | 6 |
| 4,366 | 4,538 | 4,911 | 5,183 | 5,456 | 6,548 | 7,640 | 8,732 | 7 |
| 3,820 | 4,058 | 4,297 | 4,535 | 4,775 | 5,729 | 6,685 | 7,640 | 8 |
| 3,056 | 3,247 | 3,438 | 3,629 | 3,820 | 4,584 | 5,348 | 6,112 | 10 |
| 2,546 | 2,705 | 2,864 | 3,023 | 3,183 | 3,820 | 4,456 | 5,092 | 12 |
| 2,182 | 2,319 | 2,455 | 2,592 | 2,728 | 3,274 | 3,820 | 4,366 | 14 |
| 1,910 | 2,029 | 2,149 | 2,268 | 2,387 | 2,865 | 3,342 | 3,820 | 16 |
| 1,698 | 1,803 | 1,910 | 2,016 | 2,122 | 2,546 | 2,970 | 3,396 | 18 |
| 1,528 | 1,623 | 1,719 | 1,814 | 1,910 | 2,292 | 2,674 | 3,056 | 20 |
| 1,388 | 1,476 | 1,562 | 1,649 | 1,736 | 2,084 | 2,430 | 2,776 | 22 |
| 1,274 | 1,353 | 1,433 | 1,512 | 1,591 | 1,910 | 2,228 | 2,546 | 24 |
| 1,176 | 1,248 | 1,322 | 1,395 | 1,468 | 1,762 | 2,056 | 2,352 | 26 |
| 1,092 | 1,159 | 1,228 | 1,296 | 1,364 | 1,637 | 1,910 | 2,182 | 28 |
| 1,018 | 1,082 | 1,146 | 1,210 | 1,274 | 1,528 | 1,782 | 2,036 | 30 |
| 954 | 1,014 | 1,074 | 1,134 | 1,194 | 1,432 | 1,672 | 1,910 | 32 |
| 898 | 955 | 1,011 | 1,067 | 1,124 | 1,348 | 1,572 | 1,796 | 34 |
| 848 | 902 | 954 | 1,007 | 1,061 | 1,273 | 1,484 | 1,698 | 36 |
| 804 | 854 | 904 | 955 | 1,006 | 1,206 | 1,408 | 1,608 | 38 |
| 764 | 812 | 860 | 908 | 956 | 1,146 | 1,338 | 1,528 | 40 |
| 732 | 775 | 818 | 863 | 908 | 1,090 | 1,272 | 1,464 | 42 |
| 694 | 737 | 780 | 824 | 868 | 1,042 | 1,216 | 1,388 | 44 |
| 666 | 708 | 750 | 791 | 832 | 1,000 | 1,164 | 1,332 | 46 |
| 636 | 676 | 716 | 756 | 796 | 956 | 1,116 | 1,272 | 48 |
| 576 | 612 | 648 | 683 | 720 | 864 | 1,006 | 1,152 | 53 |
| 510 | 542 | 574 | 606 | 638 | 774 | 892 | 1,020 | 60 |
| 424 | 451 | 477 | 504 | 530 | 637 | 742 | 849 | 72 |

To find the number of revolutions per minute of the wheel spindle given the peripheral speed (s.f.p.m.) and the diameter of the wheel, multiply the peripheral speed in feet per minute by 12, divide the product by 3.14 times the diameter of the wheel in inches.

$$\text{R.P.M. of wheel spindle} = \frac{\text{s.f.p.m.} \times 12}{3.14 \times \text{diameter in inches}}$$

Continued on next page



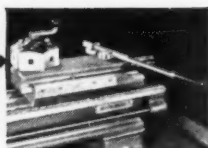
External Grinder



Milling Attachment



Handlever Tailstock



Handlever Bed Turret



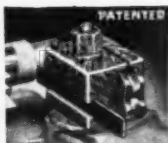
Telescopic Taper Attachment



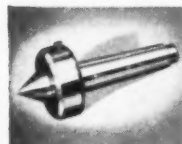
Handwheel Collet Attachment



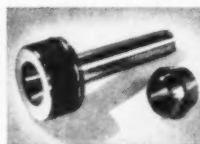
Handlever Collet Attachment



10 in 1 Tool Holder



Ball Bearing Live Center



Adjustable Collet Bushing Chuck



Square Turret Tool Block



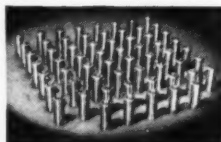
Handlever Double Tool Cross Slide



Telescoping Jaw Follower Rest and Center Rest



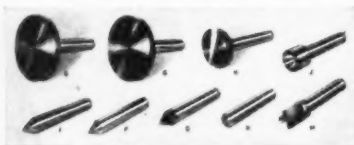
Collet Rack



Steel and Brass Collets



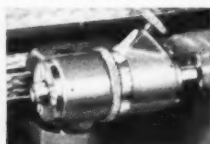
Step Chucks and Closers



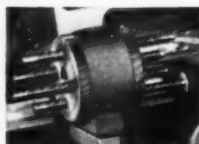
Centers and Drill Pads



Thread Dial Indicator



Micrometer Carriage Stop



Four Position Carriage Stop



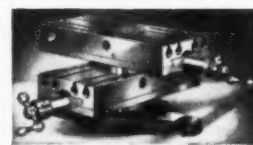
Four Position Cross Slide Stop



Safety and Standard Lathe Dogs



Coolant Pump



Universal Table

SOUTH BEND Lathe Attachments

- Cut Production Time
- Simplify Difficult Jobs
- Increase Lathe Versatility
- Speed Up Tooling
- Perform Special Classes of Work
- Reduce Operator Fatigue

Write for Catalog 5102

SOUTH BEND LATHE

Building Better Tools Since 1906

SOUTH BEND 32,
INDIANA



BLUE BOOK'S Know How Reference Sheets

Operating Speed

The following table indicates maximum peripheral speeds for various types and grades of wheels. These speeds shall not be exceeded except upon the distinct recommendation of the grinding wheel manufacturer for each specific case, and then only if the user maintains his equipment in a condition satisfactory to the wheel manufacturer.

| Types of Wheels | Vitrified and Silicate Bonds | | | Organic Bonds | | |
|--|---|------------------------|------------------------|---------------|-----------------|-------------------------|
| | Low Strength | Medium Strength | High Strength | Low Strength | Medium Strength | High Strength |
| *Type 1—Straight Wheels (Including plate mounted and inserted nut wheels) | FPM | FPM | FPM | FPM | FPM | FPM |
| *Type 4—Taper Wheels | 5,500 | 6,000 | 6,500 | 6,500 | 8,000 | 9,500 |
| *Types 5 and 7—Recessed Wheels | 5,500 | 6,000 | 6,500 | 6,500 | 8,000 | 9,500 |
| *Type 2—Cylinder Wheels (Including plate mounted and inserted nut wheels) | 4,500 | 5,500 | 6,000 | 6,000 | 8,000 | 9,500 |
| **Dovetail Wheels | 4,500 | 5,500 | 6,000 | 6,000 | 8,000 | 9,500 |
| *Types 11 and 12—Dish and Flaring Cup Wheels | | | | | | |
| Type 13—Saucer Wheels | | | | | | |
| *Type 6—Deep Recessed Cup Wheels | 4,500 | 5,000 | 5,500 | 6,000 | 7,500 | 9,000 |
| Cutting-off Wheels Larger than 16" diameter | | | | | | 7,500 to 14,000‡ |
| Cutting-off Wheels 16" and smaller | | | | | | 10,000 to 16,000‡ |
| Thread Grinding Wheels | 5,500 to 8,000‡ | 6,000 to 10,000‡ | 6,500 to 12,000‡ | | | 9,500 to 12,000‡ |
| Automotive and Aircraft Crank Grinding | 5,500 | 6,000 to 7,300 | 6,500 to 8,500‡ | | | |
| Automotive and Aircraft Cam Grinding | 5,500 | 6,000 to 8,000‡ | 6,500 to 8,500‡ | | | |
| Diamond Wheels | Cutting Wheels | | | | | |
| | (a) Metal Bonded with Steel center | | | 14,000 fpm | | |
| | (b) Metal Bonded with Metallic compound center | | | 7,500 fpm | | |
| | (c) Resin bonded with Resin or Metallic compound center | | | 7,500 fpm | | |
| | All other types | | | 6,500 fpm | | |

Note: When wheels of unusual and extreme shapes such as deep cups with thin walls or backs, long drums, or wheels with large center holes are required, consult wheel manufacturer for speeds recommended.

Note: Maximum speeds indicated are based on the strength of the wheels and not on their cutting efficiency. Best speeds may sometimes be considerably lower.

*Standard Shapes

**Non-Standard Shapes

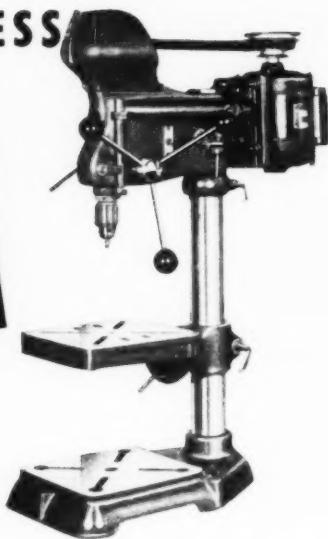
‡Depending on Stability and Design of Machine

TODAY'S BEST DRILL PRESS VALUE!

famco 15" DRILL PRESSES

Complete Line Includes:

28 models of 15" presses in single and multiple spindle models bench and floor types. (Right): No. 80 Single Spindle, tilting table bench model shown with motor. This diversified line is unquestionably the best buy in the drill press market today.



Here are a few of the many Famco Features:

- ✓ Heaviest machine in the price field.
- ✓ Precision machined throughout.
- ✓ Extra-large ($2\frac{3}{4}$ ") quill (largest in price field); greater rigidity, accuracy.
- ✓ Extra-long ($4\frac{1}{2}$ ") stroke with shorter spindle means greater bearing support.
- ✓ No. 70 to $\frac{1}{2}$ " Jacobs Chuck or No. 1 Morse Taper.
- ✓ Four sealed-for-life ball bearings.
- ✓ Full-tilting, precision-ground table.
- ✓ Quick release motor bracket mounting, (furnished as standard equipment), permits belt changes without moving motor.
- ✓ Easily adjustable feed tension control.
- ✓ Six spline spindle provides constant power and greater rigidity.
- ✓ Wide range of spindle speeds.

Rugged construction, precision workmanship, long serviceability and moderate first cost combine to make Famco Drill Presses a true member of the famous Famco team of Cost-Cutting Machines. Famco Drill Presses are sold by leading Distributors throughout the World. See yours for further details.

see our catalog in



or write for copy

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CUTTING **machines**

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SATIN CHROME

MICROMETER

CALIPERS with...

DIRECT FEEL plus FRICTION THIMBLE

**OR
RATCHET
STOP**

**A Starrett
DOUBLE
FEATURE**



No. 231
0 to 1" range .0001" graduation
With Ratchet Stop and Lock Nut

No. 231F (at top)
0 to 1" range .0001" graduation
With Friction Thimble and Lock Nut

Only STARRETT offers this double feature in micrometer design! You can choose the micrometer that best suits your needs — either with *ratchet stop* or *friction thimbles*. Both give uniform contact pressure on every measurement — insuring the same accuracy every time independent of feel. Both also provide "direct feel" — a plus feature desired by many mechanics for "feeling" certain measurements.

Ratchet stop micrometers have a convenient ratchet stop at the end of the micrometers while the thimble itself is used for "direct feel". *Friction thimble micrometers* have a friction control mechanism built into the upper section of the thimble "right under your thumb"; permitting easy one-hand operation; lower section of the thimble is integral with the spindle for "direct feel" measurements.

For consistent accuracy in precision measuring, use Starrett *Satin Chrome* Micrometers . . . they're ideal for all inspection and quality control applications. Your industrial distributor will give you prompt, dependable, quality service.



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Prompt delivery
Dependable service
Quality products

Tool Crib Control Is More Than an In-Out Record

by **Paul T. Sherwood**, Manager,
Accounting Services and Auditing
Ozalid Div. • General Aniline and Film Corp.

A SIMPLIFIED posting, a system of colored signals and an arrangement of cards, pockets and trays give us accurate, inexpensive and always-current tool crib control.

More than that, the same system is used for control of office forms, supplies, advertising and label inventories; plus tool production scheduling and purchasing.

With the tooling investment often representing as much as 10 percent of the final cost, tool control is essential to economical and efficient production. Here are the six requirements we felt a control system should meet when we installed our present "visible" control procedure:

1. Coordination of product design with economical tooling and production.
2. Coordination of tool design and tool production with determination of methods and tool requirements.
3. Coordination of tool availability with production scheduling.
4. Control of sub-contracting and purchasing of tools.
5. Control of obsolescence, modification or salvage of tooling with machine design changes or discontinuance of unit parts and assemblies.
6. Control of tool repair and reconditioning.

These requirements are affected by several factors which determine the scope a tool crib control system must embrace, including the design of the product for which the tools are to be used, quantities to be produced, facilities for production, and quantity and type of tools.

Tool crib control is not merely a matter of in-and-out movement. From designing, through production, use and servicing to retirement there should be a full, up-to-the-minute record. Similar control is needed where tool acquisition is a matter of purchase or production under sub-contract.

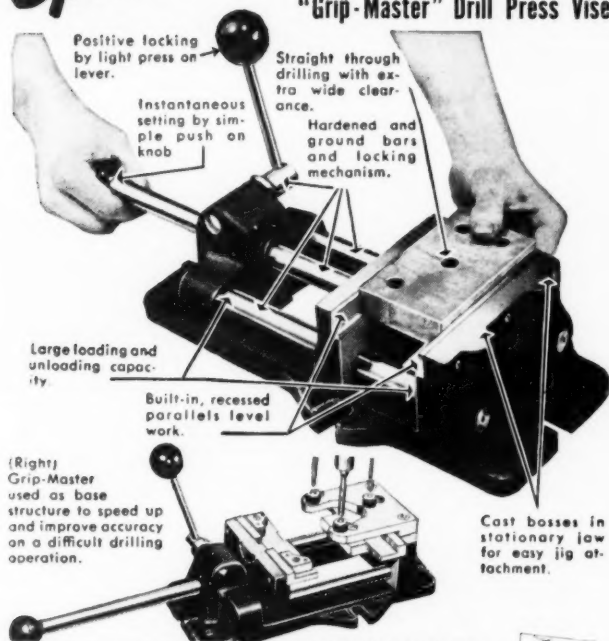
In addition to being responsible for movement in and out, Ozalid Division's tool crib personnel are directly responsible for count and, often, for spotting the first warnings of possible shortages, etc.

The tool crib at Ozalid is part of a handling and control operation broadly identified as General Supply Stores, and in addition to tools there are handled in this unit such things as office forms and supplies, advertising and sales promotion material, labels, and janitorial and grounds supplies and equipment.

Of first importance are some 6,000 jigs, dies and templates. In the same general section are the more than 2,500

Speed-up

OPERATIONS with heinrich "Grip-Master" Drill Press Vise



heinrich

TOOLS, INC.

FORMERLY NATIONAL MACHINE TOOL CO.

NEW CATALOG FREE!

Be sure you have a complete Heinrich Tool Catalog in your files. Your copy will be sent free upon request.



DEPT. 103-D • RACINE, WIS.

Drill Press Vises • Fixture Locks • Nibblers
Punches • Rod Cutters

"expendable" tools, such as standard drills, reamers, grinding wheels, milling cutters and other tools which are relatively inexpensive and readily accessible from vendors' stocks. These 8,500-plus items are drawn upon by some 200 key production workers.

Operating and control forms, stationery and office supplies number more than 1,000 different items, and advertising - promotion materials and package labels add a few hundred more,

to bring the day-to-day inventory control to more than 10,000 different items.

The dies, jigs, templates and other nonexpendable tools are controlled in a Kardex "locator" file, indexed numerically by tool number in a visible margin. Because a nonexpendable tool should always be either in a bin or on a machine, the only manual posting to the Kardex record is of the in and out dates. For at-a-glance review by production executives and others there is

SPEED UP SHEET STEEL HANDLING *with the* **VERSION**

Sheet Floater

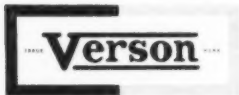


- SAVES TIME
- MONEY
- MANPOWER



The Verson Sheet Floater quickly and economically separates steel sheets and blanks for feeding presses, brakes, shears, etc. It magnetically separates the sheets—causes them to fan out for easy grasping. Feeding is speeded up, danger of cuts and lacerations to workers' hands is reduced, and the possibility of die damage due to feeding more than one piece is minimized. The Sheet Separator can be used for rectangular, round and most odd shaped pieces. It is especially helpful on oily or burred steel that tends to nest when stacked. Two Types in Four Sizes—Write for descriptive bulletin and prices.

A Verson Press for every job from 60 tons up.



**VERSION ALLSTEEL
PRESS CO.**

9303 S. Kenwood Ave., Chicago 19, Ill.

So. Lamar at Ledbetter Dr., Dallas, Tex.

a visible margin signalling system in which, by means of colored Graph-A-Matic signals, minimum and maximum stocks, "in use" and location of the tool in stock are given.

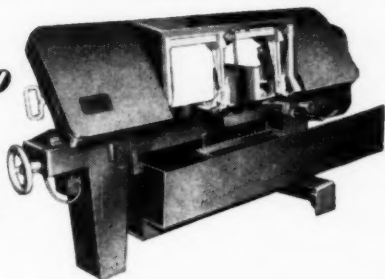
When a new die, jig or other tool or fixture is ordered, a cost department copy of the order goes to the tool crib control record, where it is used to accumulate costs of manufacture (whether company-made in our own tool department or of outside source).

The Graph-A-Matic signals are used on the visible index margins of the expendable tool and supplies card records to flag four general stock conditions: normal, minimum, ordered and overstocked. Periodic review of these signals enables tool crib or other general supply stores personnel to notify the purchasing department as items approach the normal reorder point.

All tool, fixture, supplies and equipment inventory control record cards

GET ACCURACY that SAVES STOCK...

... get
Kalamazoo
METAL
CUTTING
BAND SAWS



Here's *real* precision metal sawing that cuts waste to a minimum, saves hard-to-get stock. *Kalamazoo* Band Saws cut bars, rounds, flats, angles, odd shapes to within a few thousandths of size. What's more, there's an absolute minimum of kerf and *no* burr.

You can get Kalamazoo Metal Cutting Band Saws in three sizes ... for cutting 6" to 12" rounds. 6" x 10" to 12" x 20" flats. Each model can be had with coolant system for continuous cutting. Each is available with casters for complete portability. Write for details on the many exclusive *Kalamazoo* features that spell *better cutting at lowest cost to you.*

MACHINE TOOL DIVISION

***Kalamazoo* TANK and SILO CO.**

432 HARRISON ST., KALAMAZOO, MICHIGAN

and signals are housed in pockets on panels. In each pocket there is a card to show the signatures of department heads authorized to requisition and list groupings against which they may draw. In-out control is maintained by simply dropping requisition slips into the pockets until such time as the tool or other item is returned, at which time the slip is returned to the signer.

We take a complete physical inventory of all tools, equipment and supplies, but the work is spread out so

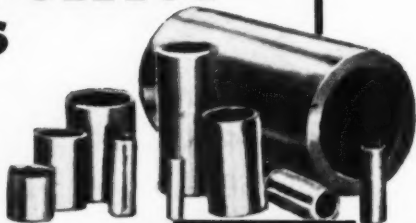
that a section is done each month. To date we have found that there has been very little, if any, need of adjustment against the Kardex records.

Involved in the tool crib and supplies control program are records which affect industrial engineering, production, methods and estimating, purchasing and general accounting. Without accurate, inexpensive and up-to-date controls at this point, efficiency all along the line can be impaired.

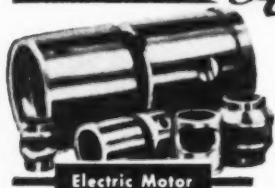
The End

STANDARD SIZE JOHNSON SLEEVE BEARINGS

*Industry's
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Over 90% of your sleeve bearing needs can be filled from Johnson Bearing Distributor stocks. This is the most complete line of bearing types and sizes on the market. The Johnson Bearing Catalog lists them all . . . keep a copy handy for ordering. If you do not have the latest catalog, write today for your copy.

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Universal
Bronze

JOHNSON BEARINGS
Sleeve-B Type

A detailed illustration of a hand, shown in white line art, twisting the knurled body of a drill chuck. The chuck is dark with a silver-colored body and a silver-colored drill bit. The brand name 'Ettco-Emrick' is visible on the silver part. The background is dark and textured.

**ONE
QUICK
TWIST**

and.....you're ready to drill

with an

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**KEYLESS
DRILL CHUCK**

• The Ettco-Emrick Keyless Drill Chuck is the nearest thing to completely automatic chucking there is. It's self-tightening and self-centering. All you do is insert the drill between the jaws and give the knurled chuck body a turn. Drilling action does the rest, clamping the jaws on the drill in a powerful, rigid grip that automatically increases with the load. No key is needed. Slipping, retightening and scored shanks are eliminated. There's no better drill chuck buy today.

Sizes in a range of capacities for No. 0 to $\frac{3}{8}$ " drills. Contact your local Ettco-Emrick distributor for details and prices.

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Worcester, Mass. • Detroit, Mich. • Chicago, Ill.

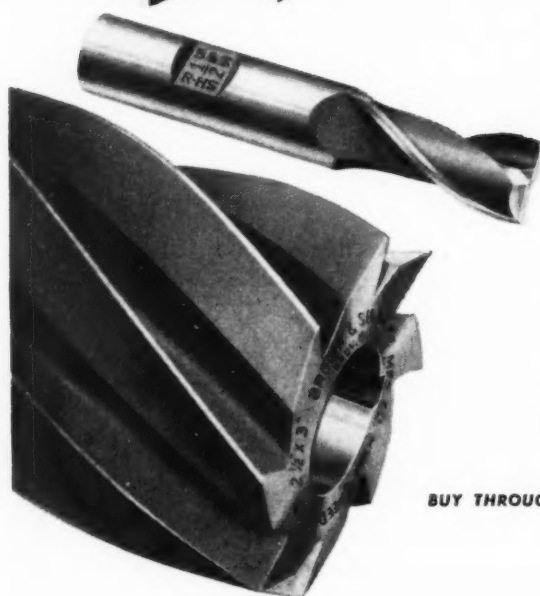
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CUTTERS *that* give you **More** **Clean Cuts** **Per Dollar**



Every cutter in the broad Brown & Sharpe line is carefully designed and manufactured to lower your *real* cutter cost . . . give you more smooth, clean cuts per dollar invested. Complete selection of types and sizes to improve milling efficiency on any job. Write for illustrated Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

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Brown & Sharpe



Foremanship Forum

Help Your Shop "Romeo" Grow Up

by **Edmund Mottershead**, President,
Mottershead Associates
Cartoons by **Glueckstein**

"SHE GOES for me in a big way, buddy," Mike says with a wink. "Sure, she's giving me that cold treatment now since she saw me talkin' it up with Flo in the cafeteria. But she'll come around when I give her that sweet talk; they all do. Wattaya say, doll." He suddenly leers at the woman worker who passes his machine. "Like that one now; I got her going and . . ." he resumes bending his fellow worker's ear.

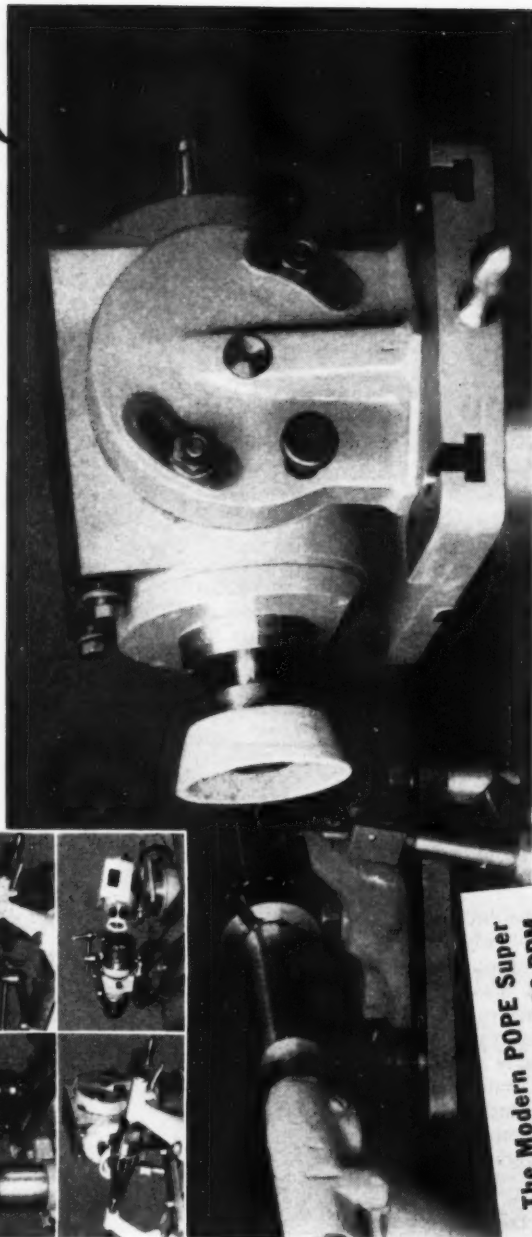
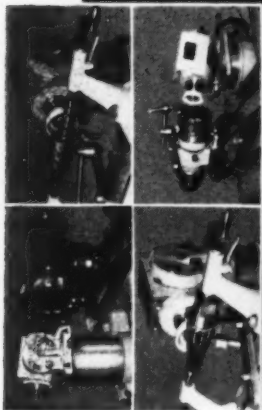
Does this Mike fellow sound familiar? Probably, for there are "lady killers" like him in thousands of plants from coast to coast. They all have this attribute in common: they're so busy trying to convince you, their fellow workers, the plant's female contingent, and often themselves that they are nature's gift to womankind that they treat their work as something incidental, something that gets done when time allows.

However, the "lover boy" can very

easily do a lot more harm in the plant than merely goof off on his own work. Mike did. His female fixation led to a messy situation in the plant which



The TOOL GRINDER For You!



**The Modern POPE Super
Precision 1 HP, 3600 RPM
Motorized Tool and Cutter
Grinder Head With
Angular Adjustment
In A Vertical Plane**

This new unit is super-precision throughout... It is designed particularly for replacement of tool grinder heads which do not have the extremely useful angular adjustment in a vertical plane.

It will more than pay for itself — reduces set-up time — makes wheels cut faster — spark out quicker — produces the kind of cutting edge on your tools that stands up and cuts longer.

No. 92

Specify

POPE

PRECISION SPINDLES

POPE MACHINERY CORPORATION

Established 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS



really put his foreman's leadership abilities to the test.

At first, the foreman, an old-timer named Burt, looked upon Mike with a combination of amusement and disinterest. He had seen dozens of these guys in his time, and he figured Mike would "grow up" in due time, as the others had.

He was wrong, though, for Mike continued on his merry way, getting involved in innumerable little romantic entanglements. They were innocent enough, to be sure, but the female of the human species is often a strange creature and the complications which followed became pretty serious.

Flo resented the attention Mike bestowed on Mary, and Mary didn't care too much for Flo, not to mention Sally, Ellie and Dottie. Eventually, Mary began to dislike Mike himself . . .

"That big hunk of cheese! I gave him the fast brush when he started getting too big for his hat and now he's trying to play you for a sucker. Me jealous? Don't make me laugh. I'm on to that guy's ways. He's not for me, I tell you. The guy's a no-good bum, and . . ."

Sally resented the implications of Mary's remarks . . .

"I thought she was a friend of mine. Boy, I know better now. What an attitude to take toward her best friend. The trouble with her is that she's jealous, that's all. Why she said to me just yesterday that . . ."

And inevitably, Dottie disliked Ellie and Sally and Mary and Flo, and Ellie disliked Dottie and Sally and Mary and Flo, and Flo disliked Mary and Sally and Ellie and Dottie, and so on and so on and so on. Oh, my sainted aunt, what a mess!

Sound complicated? But it's only half the story. Mike's fellow workers (of the male sex) began to resent his high and mighty attitude and his intrusions into **their** friendships. After awhile, about the only person in the department who didn't particularly dislike anyone was Mike himself; he looked upon himself with such fierce admiration that he had no energies left for feeling one way or another about anyone else.

Burt, the foreman, saw that he had to do something. At first he thought this situation might call for nothing less than a full-scale dressing down in his office. He realized, however, that this approach would probably convince



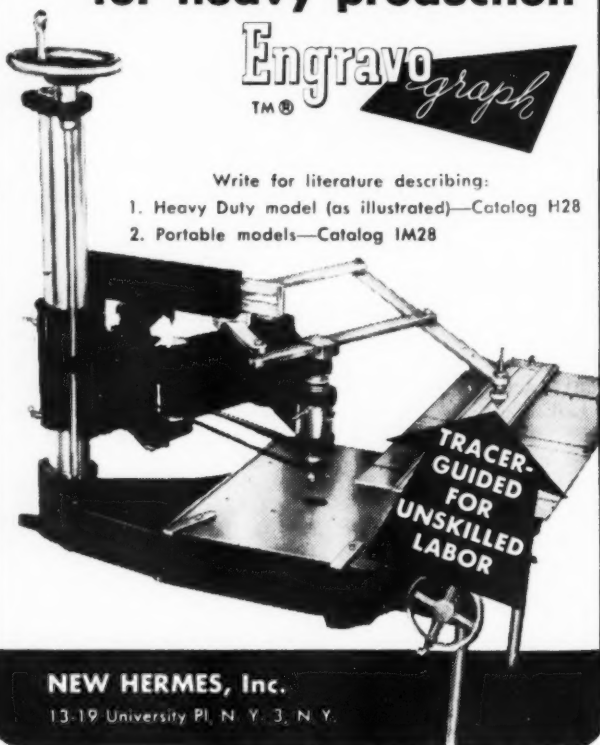
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Write for literature describing:

1. Heavy Duty model (as illustrated)—Catalog H28
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BELT DRIVEN CUTTER GRINDER



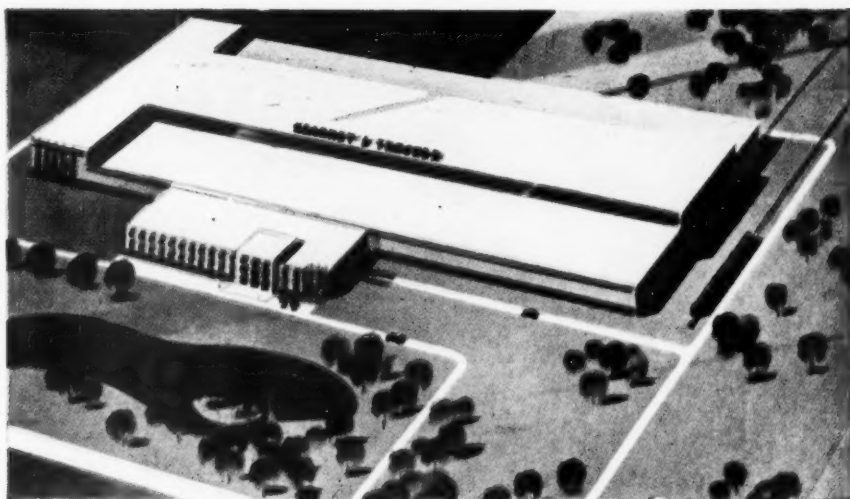
- Vibrationless
- Ball bearing grinding spindle
- Indexed for 1-4 sided cutters

Write for
folder CG-28

NEW HERMES, INC.

13-19 University Place
N. Y. 3

Mike that the world was against him because of his "irresistibility." He knew that his job was to get Mike to concentrate on his work in the plant; he didn't give a hoot about what the guy did on his own time. He realized that if he could get Mike to cut out the extra-curricular activities in the plant and take a little pride in his work, he would be less likely to break his back to establish a reputation as a Don Juan. Burt was shrewd enough to see that



Here it is! Kearney & Trecker's new Special Machinery Division — nearly 200,000 sq. ft. of new plant with new tools and equipment. An experienced, fully-staffed team of sales, engineering and production experts is ready and waiting to serve you.

INCUBATOR... for Production Ideas

This plant is being built for you ... to engineer *new* production methods — to build the large or small special machines, tools and fixtures you need to improve production and cut costs.

WILL special machines, special tools and fixtures or special arrangements of standard machines help you remedy lagging production and soaring costs?

Then be among the first to take advantage of the over \$5,000,000 investment Kearney & Trecker is making in new plant, tools and engineering to help you solve these problems.

Kearney & Trecker is *no newcomer* to the special machine tools and allied equipment field. In 50 years of existence, they've produced literally millions of dollars worth of such goods. And that doesn't include

the 60,000 standard Kearney & Trecker milling machines and other machine tools so well known and accepted the world over.

Kearney & Trecker is already working on new production ideas, equipment, and tool designs to be produced in this plant. Their Special Engineering and Methods Analysts are ready right now to serve you with prompt, immediate engineering help, plus, the newest, finest and most complete facilities to build the special equipment you need.

For details, contact The Special Machinery Division, Kearney & Trecker Corporation, Milwaukee 14, Wisconsin, today.





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● Save time—improve quality by cutting material using the CAMPBELL method of abrasive cutting.

Fully automatic models cut solid steel up to 6" diameter. Semi-automatic models cut up to 8" diameter or 8" square.

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CAMPBELL MACHINE DIVISION
AMERICAN CHAIN & CABLE

937 Connecticut Ave., Bridgeport, Conn.

CAMPBELL

Abrasive Cutters
and
Nibblers

Mike was just an egotist at heart and that he indulged in his silly flirtations primarily because of the ego satisfaction they provided. He knew that he held a trump card in that he, as foreman and as an older man, commanded Mike's respect and couldn't very easily arouse suspicions that he was jealous.

He began to firmly, but without rancor, insist that Mike stay on the job during working hours. He dropped compliments here and there to Mike

about how well he was working, when he was. Thus, he began shifting Mike's attention from ego to satisfaction through doing a good day's work.

Burt was just a touch sarcastic with the young man when he felt it would do the most good. He kidded Mike a bit about acting like an inexperienced youngster over the women. He made the fellow aware of his own ridiculous position, but he did it all in small doses and didn't say too much too early.

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MAGNETIC CHUCKING



Manual or Motor
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for 50 to 5000
Watts. Chuck
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Sq. In. Special
Models to Suit.



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Engineered for dependable power conversion for industrial purposes. Most models equipped with automatic electronic Time Delay Switch, adding years to tube life. Quiet and efficient. Fully guaranteed.

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**ELECTRO - MAGNETIC
CHUCK CONTROLS**

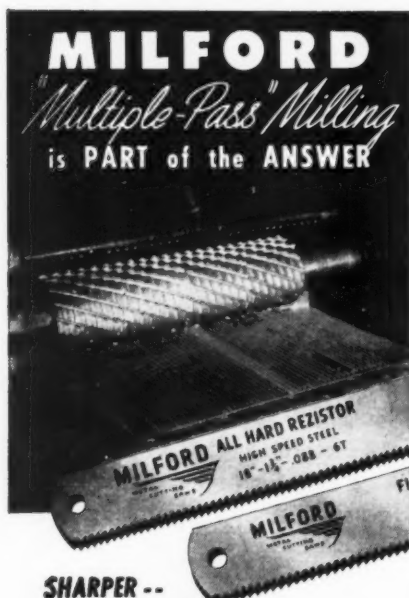
Release and demagnetize work pieces simultaneously. No time lost. No damage to work or to chuck faces. Protect chucks from voltage surges. Speed production.



32
MODELS

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50 to
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Watts

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METAL CUTTING COSTS



SHARPER --
MORE UNIFORM --
CLEANER TEETH --

Milled by multiple passes of the cutters, keener, more uniform teeth are produced, absolutely necessary for faster, smoother cutting of metals. The final burnishing pass produces the smoothly finished teeth, which assure fast, effective chip removal.

ALL MILFORD POWER HACK SAW BLADES . . . give you faster cutting with teeth that are sharp, and stay sharp longer.

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SAW BLADE SPECIALISTS
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NEW HAVEN 5, CONNECTICUT
PROFILE BLADES AND BAND SAW BLADES
HAND AND POWER HACK SAW BLADES

Sold through MILFORD Distributors who render a service tailored to your needs. The Industrial distributor is familiar with the requirements of industrial users in his area. His is a prompt personalized service as near as your telephone.

Slowly, but noticeably, a change came over Mike. He began paying more attention to his work. He became aware of the real satisfaction that could come from doing a good job consistently, with an eye on future promotions. Burt had made him feel a little sheepish about his past flirtations, and his fellow workers began to notice the change and stopped resenting him. They all assumed "the kid was finally growing up."

This was true, but a big assist belonged to Burt's fine supervision. Basically, all "lover boys" are immature and ego hungry. They usually grow up in due time, but the plant suffers until they do. It is the task of the foreman to speed up the maturing process by being firm without dogmatism, adult without stuffiness, a touch sarcastic without bitterness, and understanding in the extreme. Try it with your plant Romeo; your department will improve in morale and efficiency, and you will feel a genuine and deserved personal satisfaction.

The End





OIL BY-PASS

RELIEF VALVES

PRECISION-ENGINEERED

FOR maintaining pre-determined pressures on ram presses, machine tool hydraulic mechanisms, Diesel and oil-burning equipment.

NEED NO MAINTENANCE TROUBLE-FREE

Non-Chattering

No pounding noise because the cylindrical piston closes off the port in a shearing manner and does not seat abruptly against body of valve.

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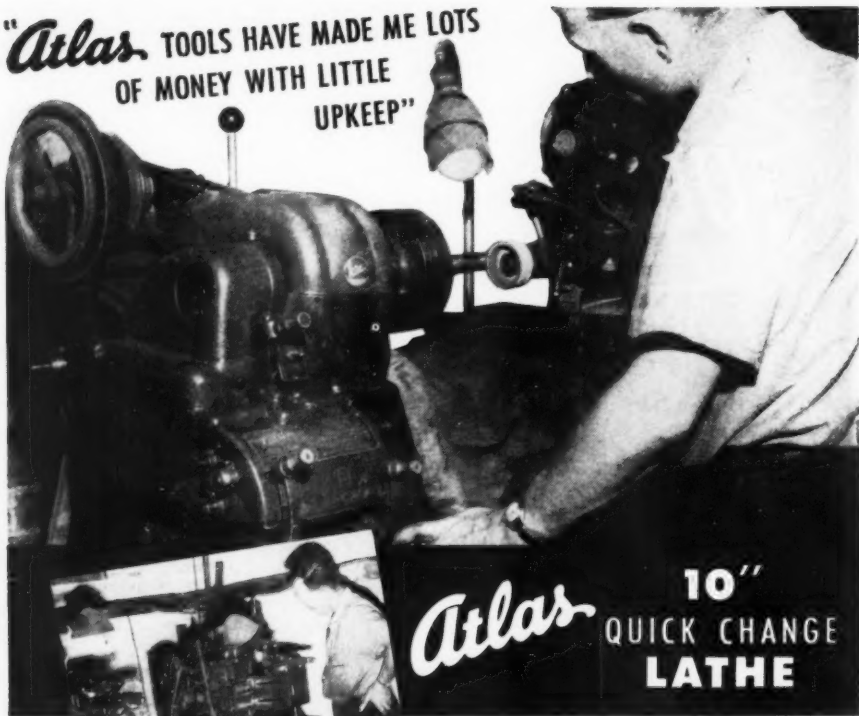


**BRASS OR
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For pressures
from 0 to 500
lbs. Pipe sizes:
1/4" to 2"
Standard or
flange types.



THE FULFLO SPECIALTIES CO. Inc.
BLANCHESTER, OHIO

**"Atlas TOOLS HAVE MADE ME LOTS
OF MONEY WITH LITTLE
UPKEEP"**



Atlas **10"**
QUICK CHANGE
LATHE

The rugged, precision-built 7" shaper, and milling machine, are other Atlas tools that have made the J. H. Ferraby Machine Shop "lots of money with little upkeep." The Atlas shaper is the only precision 7" shaper equipped with Timken bearings. The Atlas miller is the lowest cost precision milling machine.

Low first cost . . . low upkeep . . . dependable precision . . . exceptional versatility . . . *everything* recommends the Atlas 10" lathe for outstanding service in tool room, machine shop, or maintenance, as the J. H. Ferraby Machine Shop, specializing in precision work, reports. Their Atlas "has not had \$10 spent on it in five years."

The Atlas precision-ground bed, rugged accurate construction, Timken bearings, 16 spindle speeds, instant selection of 54 threads or feeds, plus power cross and longitudinal feeds, are features that deliver *top* efficiency. See these features at your Atlas dealer's, or write today for the latest catalog.

ATLAS PRESS COMPANY

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Atlas

DEPENDABLE QUALITY TOOLS SINCE 1911

**A special report
by the editors of
MACHINE and TOOL
BLUE BOOK**

Report number 28

Grinding Machines . . . part 2 Tool and Cutter Grinders

This is the twenty-eighth in a monthly series of special reports discussing various types of machine tools. Included in this month's special report on grinding machines are:

1. Grinding multitooth cutters; rake, corner angles, land; milling cutters, face mills; use of tooth rests; wheel mounting, glazing, loading, dressing.
2. Descriptions of late model grinding machines.
3. Specifications of American-built machines.

Previously published reports discussed: 1. Thread Rolling; 2. Power Press Brakes; 3, 4, 5. Milling machines; 6. Honing, Lapping, and Superfinishing; 7. Automatic Screw machines; 8. MAPI Replacement Formula; 9, 10. Chucking machines, Turret Lathes, Hand Screw machines, 11. Broaching machines; 12. Shapers, Slotters, Keyseaters; 13, 14, 15. Lathes; 16. Planers, 17. Gear making machines; 18, 19. Boring machines; 20. Drilling machines, parts 1, 2, 3, 4, 5, 6, 7; 28. Grinding machines, part 1.

Grinding multitooth cutters

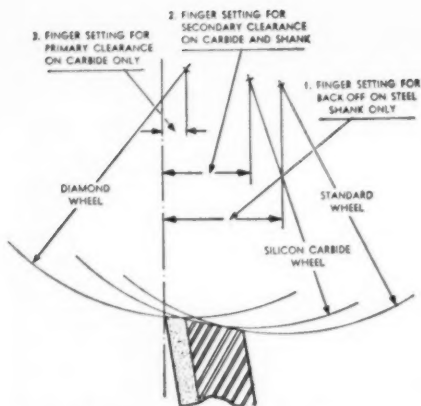
by **M. Bryan Baker**

A RULE THAT WAS brought out in last month's report on "Grinding Single Point Carbide Tools" is doubly important when speaking of sharpening a multitooth cutter—at the mere suspicion of dullness, investigate. If the cutting edge shows something between .010" and .035" wear on the peripheral relief angle, depending on operating conditions and other factors, you're likely to save yourself a lot of grief and lost time by resharping.

A decrease in performance, poor finish

and a big increase in the material to be removed through sharpening will result if the tool is allowed to go beyond a proper point; better plan to regrind often enough so that not more than .006" needs to be removed from the carbide blades.

Since wheel wear with the diamond wheel is negligible, the tip grinding of cemented carbide milling cutters and similar tools, with the diamond wheels, is easier than grinding a high speed steel tool with an ordinary toolroom



1. The secondary clearance should first be ground in the steel shank using the regular high speed steel grinding wheel. The wheel should then be changed to a silicon carbide wheel and the secondary clearance ground on both the shank steel and the carbide tip. Do not allow this wheel to contact the cutting edge of the carbide tip and never use it for grinding primary clearance. This is to prevent the wheel from chipping the carbide edge.

wheel. Circular form tools may be ground on a tool and cutter grinder or they may be set up in a vise on a surface grinder.

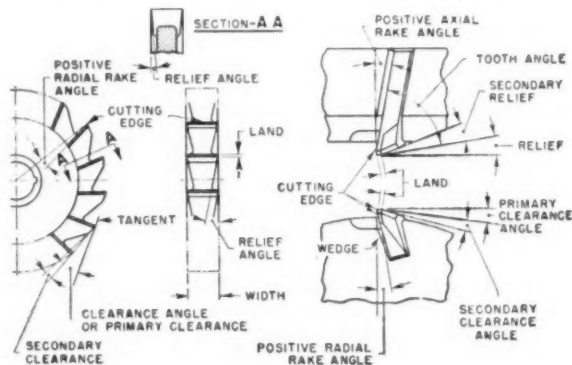
The grinding is done only on the tip at the front of the cutting edge. The

form put on the tool in manufacture is not disturbed, figure 1.

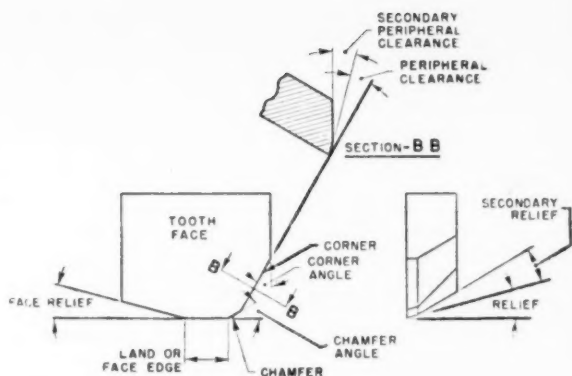
Rake, corner angles

In peripheral milling cutters, such as flat mills, slotting cutters and saws tipped with sintered carbide, the rake angle is generally defined as the angle in degrees, measuring the deviation of the tooth face from a radial line to the cutting edge. This is the radial rake angle, figures 2 and 3. Cutters of this type generally have negative radial rake angles of 5° for soft low carbon steel to 10° or more for alloy steel and positive axial rake angles of 5° to 10° , respectively, which in some cases may be 0° in slotting cutters and saws. On soft materials, such as free cutting aluminum alloys, positive rake angles of 10° to 20° are often used. In face milling cutters tipped with sintered carbide the teeth are inclined with respect to both the radial and axial lines, figures 2 and 3. These angles are called radial and axial rake angles, respectively. The radial and axial rake angles may be positive, zero or negative. In face mills great variation is found in the value of the radial and axial rake angles in relation to the grade of sintered carbide material used, the material being cut, the value of the corner angle and setup conditions. When face milling steel with zero corner angle cutters,

2. Milling cutters are composed of a number of elements, depending on the type of cutter, the material being worked, method of milling employed, speeds, feeds, etc. The diagram at the left is a side milling cutter and that on the right is a face milling cutter.



3. Face milling cutter tooth with nomenclature of milling cutter elements.



negative radial and axial rake angles are used; but with cutters having large corner angles, a combination of a negative, radial and positive or negative axial rake angles is employed, depending upon the rigidity of the setup. Under good setup conditions the combination of a negative radial and positive axial rake angles is preferred. Positive radial and axial rake angles are commonly used when milling cast iron with face mills having zero corner angles and a small chamfer or radius. With a large corner angle, positive axial angles with either positive or negative radial rake angles are used with a 60° single corner angle or a double corner angle of 60° to 45° combination. This is done to increase cutter life and to reduce work breakout and wear on carbide tips caused by scale.

Two basic milling cutters

In sharpening there are two basic types of milling cutters. The straight and the spiral tooth, side milling, face mills, end mills, reamers, and the like, are all sharpened by grinding on the periphery, or relief. There is a definite profile on form cutters that must be maintained, including formed cutters, taps, some reamers, and gear cutters. The faces of the teeth are ground in sharpening without disturbing the pro-

file. Most of the rules brought out in the foregoing article on grinding single point carbide tools can apply pretty much to multitooth cutters. Two things, however, are different and should be observed: one is to avoid finishing multitooth carbide tools with silicon carbide as the wheel wears so fast it will be necessary to check each tooth for height. Also, keep away from using a diamond wheel when sharpening a tool that contains both carbide and steel and where both metals have to be contacted at the same time. Steel tends to pull the diamonds from the bond.

Those cutters ground on the relief can be sharpened with either a cup wheel or a straight wheel. The use of a cup wheel avoids a tendency to hollow grind; however, the straight wheel can be tilted slightly to secure approximately the same end, depending upon the direction of the wheel rotation. A desired relief angle is obtained by having the center line of the cutter below or above the center line of the wheel while grinding with the periphery of a straight wheel.

Land

In peripheral milling cutters the land is a narrow surface back of the cutting edge which results from providing

the clearance angle. The width of this land varies from 1/64" in small diameter cutters to 1/16" for cutters of larger diameter. In face mills the term "land" is often used in referring to that portion of the cutting edge which is parallel to the face of the cutter, figure 3. This is more correctly called the face edge. The length of the face edge may vary between broad limits but usually should be somewhat greater than the feed per revolution. For general purpose operations a 1/8" length is generally ample for large diameter and a 1/16" length for small diameter face mills.

The clearance angle is that angle provided back of the cutting edge and should be carefully selected in all types of cutters. The value of the clearance

angle is great since it plays an important role in obtaining good cutter performance, high cutting efficiency and long cutter life between grindings.

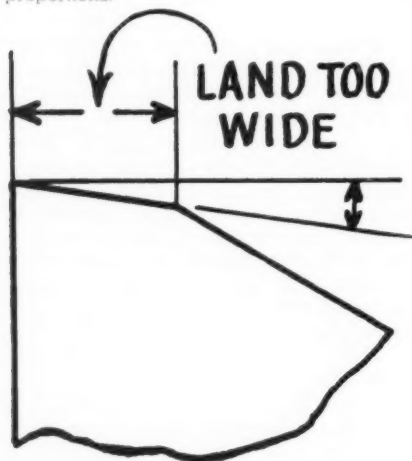
It is desirable in all cases to use a clearance angle as small as possible, so as to leave more metal for heat dissipation and insure cutting edge maximum strength. Any clearance angle greater than required by the cut will weaken the cutting edge and may cause failure under operations that are extra heavy; moreover, it will increase the likelihood of a poor finish on the machined surface, reduce cutter life, and cause chatter.

The clearance angle is sometimes referred to as the primary clearance, since the secondary is usually provided when resharpening these cutters. Repeated sharpening of the cutter eventually increases the width of the land to a point where interference with the surface being milled may develop, figure 4. To eliminate this interference and maintain the desired width of land without weakening the section of the tooth, a secondary clearance is ground on the back of the tooth. This angle is usually 3° larger than the primary clearance angle, figure 3. Since the cutting edge in face mills is on both the periphery and face of the cutter, the clearance angle must be ground along the complete contour of the cutting edge. This also applies to face mills having a corner or round nose.

Milling cutters from 1/8" to 3" in diameter, for general purpose work, have clearance angles from 13° to 5°, respectively, and decreasing proportionately as the diameter increases. In cutters over 3" in diameter, the cutter manufacturers provide a clearance usually of 4° to 5°. The land is about 1/64", 1/32" and 1/16" wide in small, medium and large diameter cutters, respectively.

The term "relief," figures 2 and 3, in cutters such as side mills, metal slitting saws and face mills refers to the angle

4. After repeated sharpening, the land becomes too wide. This is the narrow surface immediately behind the cutting edge of the tooth which is ground to the clearance angle. This should have a width of about 1/32" to 3/64", varying with the cutter or reamer. Repeated sharpening causes this land to sometimes become so wide that the heel of the tooth drags on the work. The secondary clearance should then be ground back to narrow the land to the proper proportions.



provided regularly on the sides or face of the cutter to reduce or eliminate rubbing and binding on the work. The most commonly used values of relief angles in milling cutters are from 3° to 5° and in saws from 1° to 2°. The true clearance on the corners of face mills is measured in the axial and radial planes and is the result of the clearance angles.

Face mills

In sharpening a face mill after new tips have been brazed into place, circle grind the periphery, the face, and finally the corner angle. Use a 60 grit silicon carbide straight wheel, 6" in diameter and 1/2" wide.

Grind the face of the carbide tip; set the tooth rest behind the projection of the carbide tooth after first filing all excess braze off the carbide. After the tooth has been adjusted for its proper rake, its rake is maintained by feeding the tooth rest so as to rotate the cutter. Generally, one tooth can be ground completely before passing on to the next tooth. However, to prevent overheating of the carbide during the grinding operation, extreme care must be taken.

Grind the primary peripheral land. If this land should be too long, then a secondary land should be ground.

Grind the clearance on the cutter face. If the face angle is less than 1° grind a secondary face relief. The flat portion of the face cutting edge should exceed the feed per revolution by approximately 25%. Grind the clearance lands on the corner angle; check the run-out on the periphery, the corner and the face, using a 1/10,000" indicator. And, at the same time, make certain that no part of the cutter body projects beyond the cutting edge. It is desirable that runout be kept to .0005" for cutters up to 6" and .0005" for cutters up to 12" in diameter. If the cutter is to be used for the milling of steel, bevel the cutting edges .002" x 45° by hand

with the diamond hone.

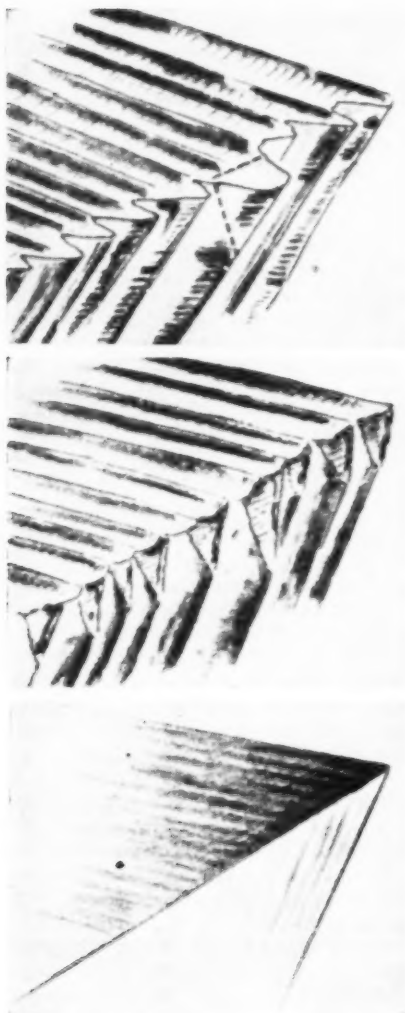
The land, or the narrow surface immediately behind the cutting edge of the tooth, figure 4, which is ground to the clearance angle, should have a width of about 1/32" to 3/64", varying with the cutter or reamer. As sharpenings are continued this land will become wider. If it gets too wide the heel of the tooth will drag on the work. Then is when the secondary clearance should be ground back to narrow the land to the proper proportions. A table that might serve as a guide for average cutters in general practice (being reduced in large cutters and increased slightly for smaller cutters) follows: ordinary low carbon steel, zero to 7°; hard steel, 2 1/2° to 5°; steel castings, 6° to 7°; cast iron, fast feeds, 3° to 7°; bronze, cast, 10° to 15°; tough bronze, 4° to 7°; copper, 12° to 15°; aluminum, 10° to 15°.

After the complete grinding operation, cutter teeth should be examined carefully with a 10 to 25 power magnifying glass. If any defects on the cutting edges show up at this time the cutter must be resharpened. The surface finish on carefully ground teeth should be below 5 micro inches.

A milling cutter free from burrs and grinding marks, with clean cutting edges and a high finish, always has more efficient cutting action and will produce a better quality of finish on the surface and last longer than a cutter with edges showing a poor finish. If not properly ground the cutting edge appears as an irregular saw tooth shape when viewed under the microscope, figure 5.

Use of tooth rests

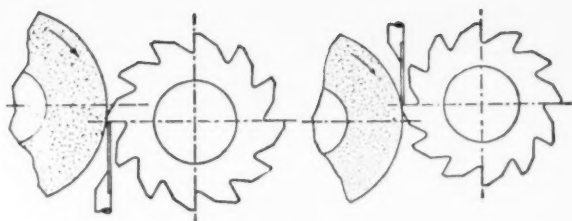
It is best to use the type of rest that will give the most support to the cutter tooth. Its selection depends upon the spacing of the teeth in the cutter and their rake angle. Small end mills whose teeth are close together call for a rest narrow enough to pass between



5. (top) Artist's conception of rough ground cutting edge magnified many times. Notice the hills and valleys created by the abrasive grains of the grinding wheel in rough grinding. (center) Here the peaks, unequal to the heavy load, have broken off, quickly dulling the cutting edge. (bottom) This shows a good cutting edge. It should be as nearly an unbroken line at the junction of two planes as it is possible to obtain.

the two teeth. There should not be more than $1/32$ " clearance between the tooth rest and the grinding wheel. Tooth rests and tooth contact should be directly opposite where the wheel is cutting. Two ways to restore relief, shown in figures 6, 7 and 8, are grinding "on" or "off" the edge. In grinding "on" the operator must hold the tool up against the rest firmly by hand. He can grind "off" the edge, which permits full use of the tooth rest; that is, the rest will take the thrust of the work automatically. Many of the top grinders prefer to grind "on." Grinding "off" the edge is apt to throw up a burr unless the cut is light and it is also more apt to burn the tool. If the clearance has been rough ground before, it is easy to hold up the cutter for the finishing operation on the relief. However, as was the case with single point tools, there's another matter to be reckoned with. Grinding on the periphery of a straight wheel is actually hollow grinding which gives an apparent angle that is much larger than the real angle, while a cup wheel gives no such effect, figures 9 and 10. Although cup wheels are to be preferred for this work, plain wheels are frequently used where the lands are narrow and diameter of the cutter is small; cup wheels are generally used on wide lands and large diameter, figures 11 and 12. Of course, the proper clearance behind the cutting edge of the tooth is essential. Too little clearance causes the heel of the tooth to drag over the work resulting in friction and slow cutting. Too much clearance will produce excessive wear and chatter. Too much is better than too little clearance. Generally the plain milling cutters whose diameters do not exceed 3" are ground with a clearance angle of 6° to 7° . Larger cutters should have an angle from $3\frac{1}{2}^\circ$ to 5° , depending on the design and use of the cutter. Secondary clearance varies from 9° to 30° , figures 2 and 3.

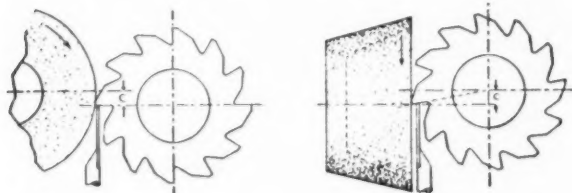
6. Grinding "off" and grinding "on" the edge, while sharpening milling cutters.



Wheel mounting

Diamond wheels require a mounting technique which will center the wheel so that an absolute minimum of dressing will be required before starting to grind. To bring a diamond wheel into running true the wheel and flanges must first be wiped clean. The wheels

diamond wheel into running true. The wheel is mounted between flanges and the nut pulled up snugly but not fully tightened. A piece of flat steel is laid on the magnetic chuck and the wheel is lowered until it barely touches the steel. The wheel is turned by hand and at one point will bind on the steel;



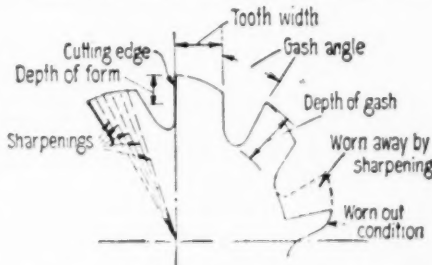
7. Developing the relief angle with a straight and with a cup wheel.

should be mounted between the flanges and the nut tightened snugly by hand. An indicator then should be used to determine high and low sides. A piece of softwood should be held against the high side and tapped gently with a hammer, figure 13. The indicator then must be used and the process repeated until the desired accuracy is reached. Usually running .0005" to .0001" can be obtained with little difficulty, which is close enough for most applications. The nut then should be tightened and a final check made with the indicator.

True running is essential with diamond wheels because they are expensive and the relatively thin diamond coating would quickly be worn away and wasted by ordinary truing. To obtain true running, diamond wheels are mounted on tapered bushings.

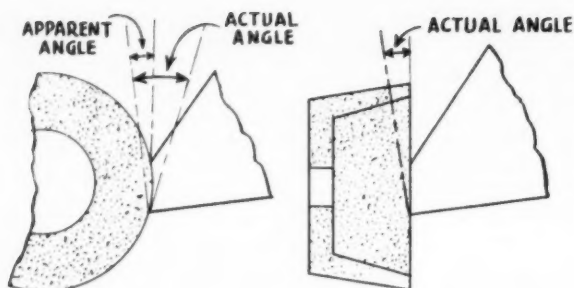
Another way, that does not employ an indicator, can be used to bring the

leaving the wheel in that position, the wheel mount is tapped downwards at this point using a plastic hammer. The wheel is then lowered another 10



8. The teeth in this radial cutter are formed correctly as the sharpening lines meet at the center.

thousandths and the process repeated until the wheel turns with equal ease throughout a complete turn. The nut is then fully tightened.



9. Plain wheel (left) and a cup wheel (right). This shows that in the use of the plain wheel, the actual angle at the cutting edge is in reality much greater than the apparent angle. Use of the cup wheel eliminates this deception.

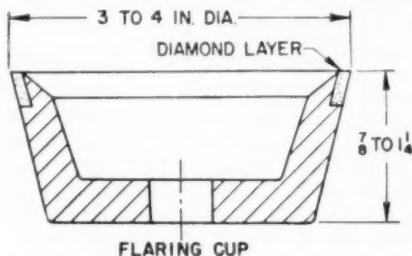
Vitrified bond diamond wheels having a vitrified portion bearing on the flanges need blotters. Some vitrified bond diamond wheels and all resinoid and metal bond diamond wheels are mounted without blotters.

Arbor holes in diamond wheels are made slightly oversize to compensate for differences in spindle diameters. Flanges used must be flat and of approved design with equal bearing on back and front flanges.

It is a good practice to have a separate collet or adapter for each diamond wheel so that once a wheel is mounted it can remain on its mount throughout its life even though it is removed from

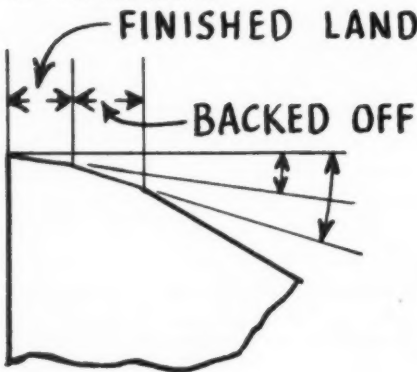
the machine. A taper spindle is a necessity for this type of mounting. Side mounted but with these it is not peripheral runout but side runout which must be avoided. Thin shims or cig-grinding wheels can be similarly rette paper or cellophane may be used used great care must be exercised to prevent cracking the wheel.

Excessive tightening of the flange is



11. A diamond wheel with diamond coating located on the periphery.

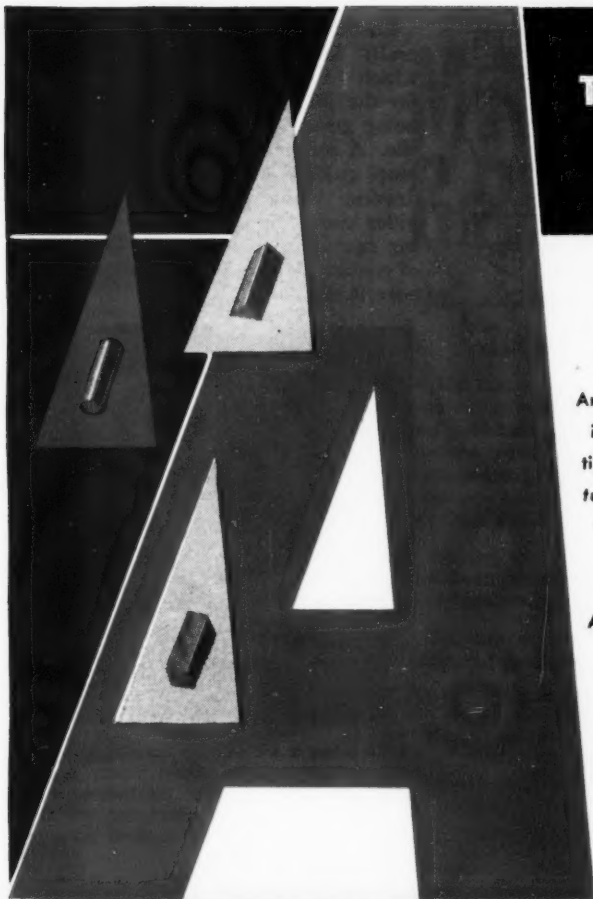
10. Clearance angle of a new cutter. The proper clearance behind the cutting edge of the tooth is very essential. Too little causes the heel to drag, too much brings on wear and chatter.



a much more common fault than tight-to align the wheels. If such shims are ening too little. It can cause a wheel to crack. Draw up all the screws evenly one at a time and with a wrench pull no more than necessary to prevent the wheels slipping between the flanges.

Glazing and loading

The face of the loaded wheel, figure 14, is filled with particles of soft or ductile metal from the piece being ground. Since the pores or spaces be-



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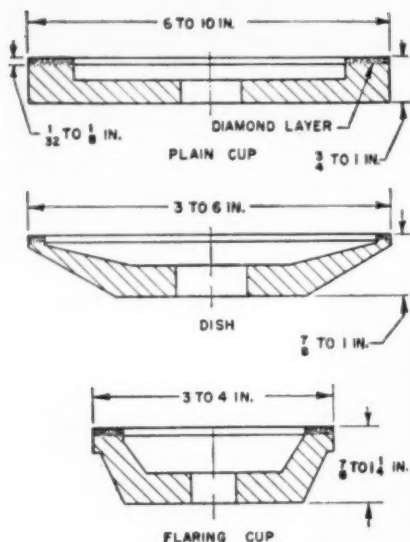
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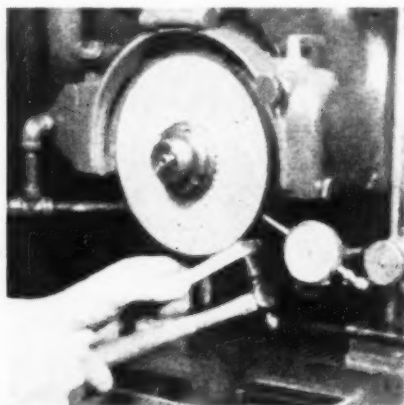
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12. These show the most commonly used shapes of diamond wheels having resinoid or metal bonding.

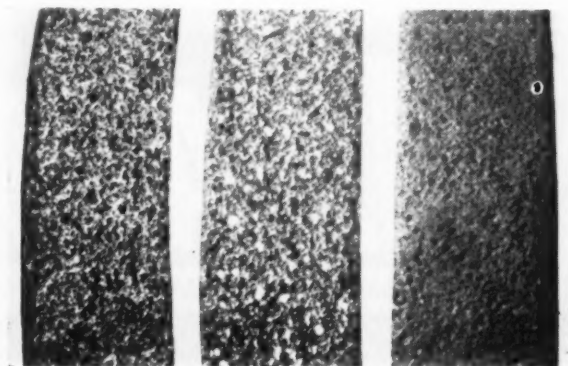
tween the cutting grains are filled, further effective cutting action is impossible since there is no provision for the chips or removed grains to be discarded, thus failing to expose new cutting grains. Moreover, a loaded wheel will generate much more heat and is liable to burn the work if the condition is not corrected.

Loading in a grinding wheel can generally be attributed to using a wheel which is either too hard or too fine for the job, particularly when a metal being ground is relatively soft or ductile. A softer grade wheel wears down more quickly and requires less frequent dressing, while a coarser wheel provides more chip clearance. If the grinding operation is wet, check the supply of coolant flowing to the wheel to make sure it is clean.



13. To bring a wheel into running true, one method is to tap the wheel lightly until it runs true within 0.0005" as indicated on the gage, then tighten clamping nut with wrench, being careful not to exert too much force.

14. These 3 illustrations show the difference in sharp, loaded and glazed grinding wheels, reading from left to right.



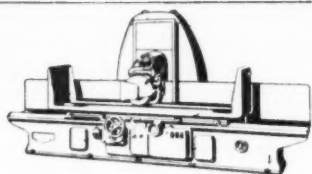
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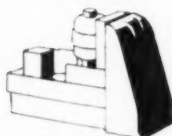
Disc Grinders,
Double Spindle Type



Vertical Spindle
Disc Grinders



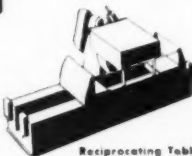
Plane Grinders,
Rotary Table Type



Rotary Table
Surface Grinders



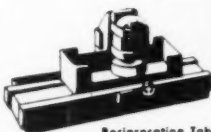
Automatic Rotary
Surface Grinders



Reciprocating Table
Face Grinders



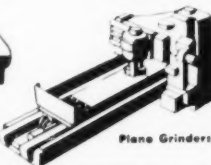
Disc Grinders,
Single Spindle Type



Reciprocating Table
Surface Grinders
Vertical Spindle



Face Grinders,
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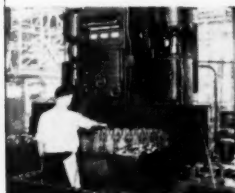
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15. Truing the face of a cup wheel with abrasive grain. The use of a diamond dresser is not recommended because it soon wears flat and results in excessive cost.

Glazing shows if the wheel is not breaking down properly. This might be due to the wheel itself, to the dressing or to incorrect usage. A softer grade or coarser grit size might correct the trouble. A coarser dresser will open up the cutting face. In facing, the

16. Dressing a diamond wheel with a dressing stick. When loaded or glazed, sharpness can be restored by gently dressing resinoid bond wheels with a piece of lump pumice or a special aluminum oxide stick. For metal bond diamond wheels a silicon carbide stick is recommended.



grinding wheel pressure or the wheel feed will also help the wheel to break down. If grinding wet, be sure the coolant is not oily or inadequate in amount. If the condition is not corrected when a wheel has become loaded or glazed, frequent dressing is needed in order for the wheel to cut freely. This practice is naturally both wasteful and time consuming and increases the total grinding cost. It is important to select the correct grinding wheel for the job and also to operate it at the correct speed to insure maximum wheel life. It is also important of course to employ the correct grain and grade of grinding wheel for each job and to use the wheel properly with respect to speed, grinding pressure or feed, dressing technique and other important functions of grinding procedure.

Dressing the Diamond Wheel

Diamond wheels are dressed with a soft aluminous abrasive of 80 to 120 grit passed slowly across the face of the wheel with a light, even pressure. This should be done at about $\frac{3}{4}$ of the operating speed. The wheel should be greased with paraffin while being dressed.

Wheels of the cup or disc type, figures 11 and 12, may also be resurfaced by scrubbing them on a flat plate sprinkled with silicon carbide powder of 180 to 220 grit, figure 15. This operation can be performed dry. It should be done with a circular sweep of the arm and a light, even pressure, changing the position of the wheel in the hand frequently to insure uniformity in dressing.

The cutting faces of some side grinding wheels which have become grooved in use may be trued by lapping with loose abrasives. A flat cast iron or glass plate may be used for such operations, figure 15. A small quantity of 220 grit silicon carbide grain is used for lapping wheels in a medium range of grit sizes, although coarser and finer grit

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sizes may be used for coarser and finer grit wheels. For diamond wheels of 320 grit and finer, it is better to use 220 grit aluminum oxide grain since silicon carbide may charge the wheel face and later produce scratches in the work. The lapping operation should be done dry by hand using a figure 8 motion. The wheels should be given a slight turn under the hand after each figure 8 in order to maintain parallelism of face and back. Cup wheels may be dressed either by lapping or grinding.

Reverse wheel

After extended use the corner of the straight diamond wheel will round over to the point where the radius is too large to grind an effective chip breaker, in the case of single point tools. When this occurs and the other side of the wheel is still sharp reverse the wheel on the spindle. When both corners have worn to an excessively large radius, it is necessary to true the wheel to square up the face. One method of doing this is to remove the wheel from the machine and grind it in a cylindrical grinder with a silicon carbide vitrified wheel of medium grit size and soft grade. Rotate the diamond wheel very slowly while the silicon carbide wheel runs at normal grinding speed. Continue grinding, taking light cuts until a flat face has been restored on the diamond wheel. This truing operation can be facilitated by mounting the diamond wheel on a collet which fits tightly on the spindle.

The following method is another convenient means of restoring a flat face to wheels such as those used for chip breaker grinding. A tool post grinder is attached to the machine table where it may be left permanently if desired. The axis of this grinder is set at 30° to the axis of the diamond wheel. Light down feeds are employed and the dressing wheel is traversed along the axis to the diamond wheel. Grinding should be as wet as possible. The 30° angle of

the wheel causes a scrubbing action which materially assists the operation. The diamond wheel is not slowed down but turns at normal speed during the dressing.

After the wheel has been put to running true it should be left on the collet until worn out. When it becomes necessary to reverse the wheel or transfer it to another grinding machine for truing, the wheel and collet should be removed from the spindle as a unit. If the cutting face of the diamond wheel is of the vitrified bonding type it must be dressed or opened up after truing. This can best be done with a 1/2" square silicon carbide stick pointed at one end, figure 16. Apply it to the underside of the wheel and roll it from the middle of the periphery, first to one side and then to the other, in a manner to avoid rounding the corners of the wheel, until the wheel when stationary feels sharp to the touch. Never force the stick straight into the wheel the full width of the stick as this will tend to break down the sharp corners of the wheel left by the cylindrical grinding operation.

Using a silicon carbide stick for cleaning and dressing the wheel takes from 3 to 10 seconds depending upon the bond and the amount of load and glaze to be removed. Dressing should be done wet at normal work speeds. If coolant equipment is not available light oil may be applied to the wheel with a paint brush while the dressing stick is being used. The wheel face should be kept sufficiently clean to cut freely while light pressure is used in holding the tool to the wheel. Excessive dressing removes bond material and allows diamonds to fall out, thus shortening wheel life. The use of a set diamond dressing tool is not recommended.

Dressing by grinding

Other wheels which have shapes which cannot be dressed by lapping must be ground. For this type of dress-

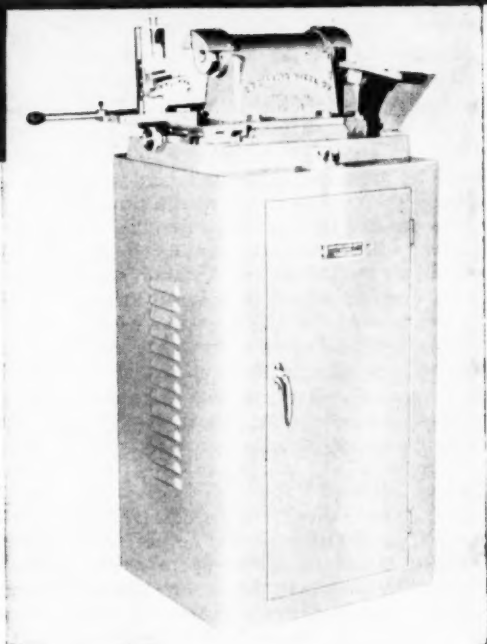


R_x for those GRINDING PAINS

Here's Big Relief For Congested Tool Maintenance Departments!

MODEL CH-105A CARBIDE TOOL GRINDER—Use this space and time-saving carbide tool grinder nearer the production line . . . to expand your overcrowded tool crib facilities. Complete machine, ready to plug-in and use.

Includes: 2 Diamond Wheels for offhand and chip breaker grinding; recirculating coolant system; ½ horsepower 3 phase motor, wired for instant reversing; sealed ball bearing spindle runs in oil bath.

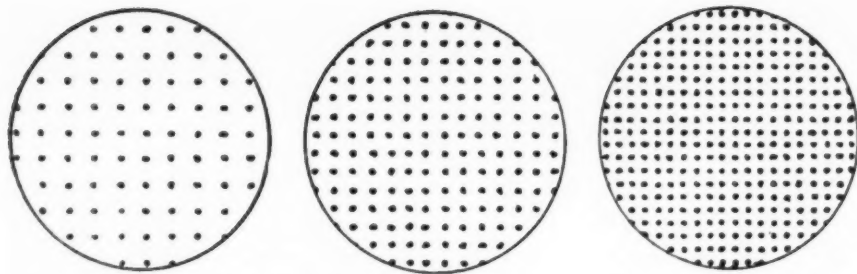


FOR YOUR EXISTING GRINDING EQUIPMENT . . .
For highest quality, speedy delivery and competitive prices use **United States Diamond Wheel Company's** complete line of resinoid and metallic bonded wheels. Special process controlled for extra-long, high performance in rapid stock removal . . . perfect "spark-out" on large diameter cutters . . . faster cutting action . . . maximum economy of carbide removed per dollar of wheel cost. **HUGE COST SAVINGS**—send for catalog to **UNITED STATES DIAMOND WHEEL COMPANY.**

"American made for American industry"

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Aurora, Illinois



17. This shows the relative diamond concentrations in diamond wheels. From left to right they are, 100, 50 and 25 concentration, respectively.

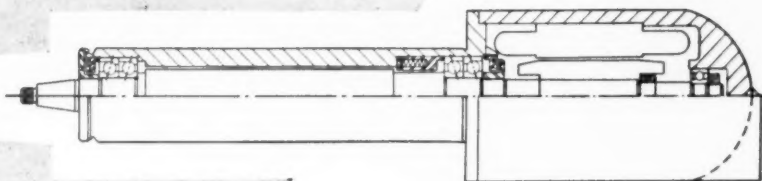
ing operation, the diamond wheel is mounted between centers and is par driven at about 200 s.f.p.m. Wherever possible, traverse grinding should be employed. The diamond wheel should not be rotated by hand since the uneven motion will cause flat areas to be ground on the periphery. An aluminum oxide vitrified wheel is generally used for this type of dressing operation which should always be done wet. When a special form face is to be ground into the diamond wheel, unless a special machine for generating reform is available, plunge grinding is necessary with the reverse of the special form diamond-dressed into the dressing wheel. Sometimes it is necessary to dress a small radius on the corner of a diamond wheel. A skilled operator can do this free handed with a hard silicon carbide stick, figure 16. Accuracy can be checked by plunging the diamond wheel into the edge of a thin strip of plastic or fiber and checking this cut on a comparator from time to time during the operation. This method may be used if tolerances are .0002" or larger.

Different carbide grades

There are many grades of cemented carbides, each intended for a particular class of work. They vary widely in grinding characteristics with respect to the type of abrasive best suited for grinding them. The softest and toughest

grades such as welded-on cemented carbides are best ground with green grit silicon carbide. Intermediate grades may be ground with either silicon carbides or diamond abrasives. The extremely hard grades require diamond abrasives. Friable silicon carbide is used in the softer grades to provide a soft sharpening-action which promotes the coolness of cut so necessary when grinding carbides. Diamonds are much harder and tougher than the silicon carbides. These are generally employed in wheels which are strongly bonded to get the maximum abrasive value from each particle. The freedom of cut and the sharpness of the diamond is what gives it its cool cutting qualities. For roughing operations before the final diamond grind, silicon carbide wheels are preferred, same as in grinding single point tools. These can be used where steel and carbide must be ground together and they are also lower in first cost. Heavy stock removal operations on bad work or broken tools may be performed with the silicon carbides if the wheel is kept open and free cutting. However, if the steel shank can be ground without the wheel touching the carbide, an aluminum oxide wheel should be used. When grinding multiple tools such as milling cutters and reamers care must be taken to maintain the proper work size. If the wheel does not hold size completely

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rigid regardless of wear or temperature change.

—Spindles stocked for #2 Brown & Sharpe, Do
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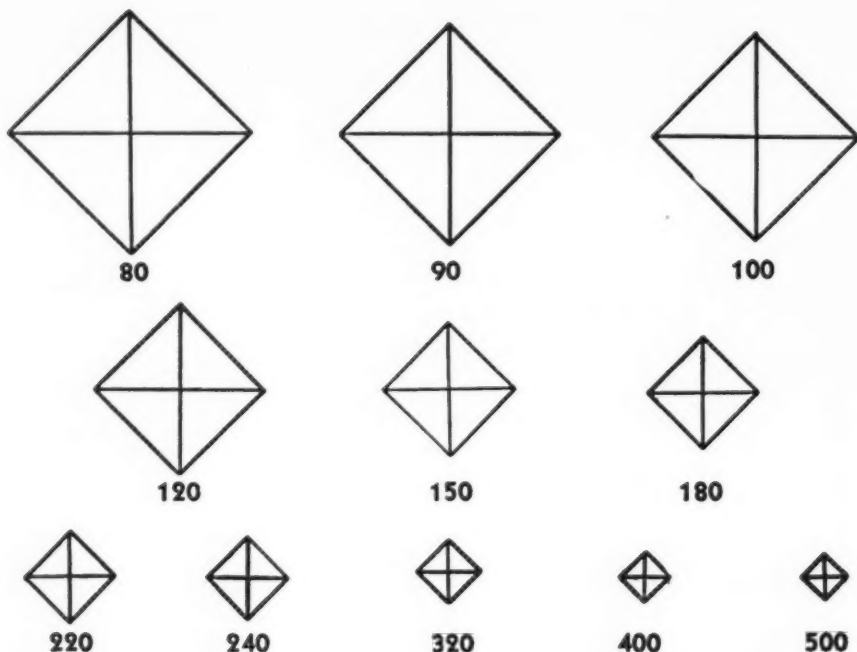
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18. Diagram showing the relative size of the 11 standard grit sizes of diamonds, magnified over 50 times.

around the tool, high and low teeth may result. Also, heavy stock removal operations on badly worn or broken tools may be performed more economically with silicon carbide wheels provided they are kept open and free cutting. The silicon carbide wheels in resinoid bond offer improved form holding qualities over silicon carbide wheels in vitrified bond and are used for cutter or chip breaker grinding. They require the use of heavier end feeds than normally are used with diamond wheels. For many single point tools applications a keen edge is unnecessary and sometimes is undesirable since it is easily broken and chipped by scale or sand when the tool is used for turning castings or forgings. Tools for this purpose usually have an edge intentionally

blunted by a very small 45° land honed on the cutting edge. Silicon carbide wheels may be used for both roughing or finishing such tools.

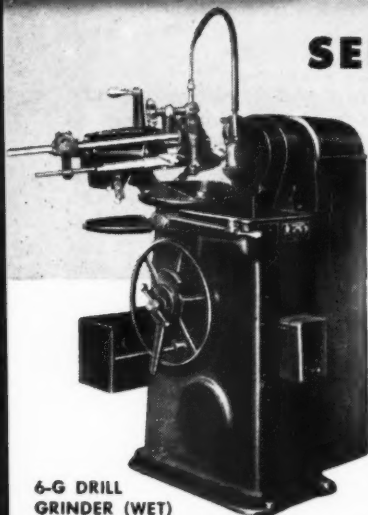
Diamond concentration, grit size

Diamond concentration is of three grades, 25, 50 and 100, figure 17. Diamond wheels are made in grit sizes from 80 to 500, figure 18, and classified as coarse, 80 to 150 grit; medium, 180 to 240 grit; fine, 320 to 500 grit. Within this range it is comparatively easy to rough grind for stock removal with a coarse grit wheel to obtain an excellent cutting edge with a medium grit wheel, and for special cases to produce a mirror finish with a fine grit wheel.

Concentration refers to the relative

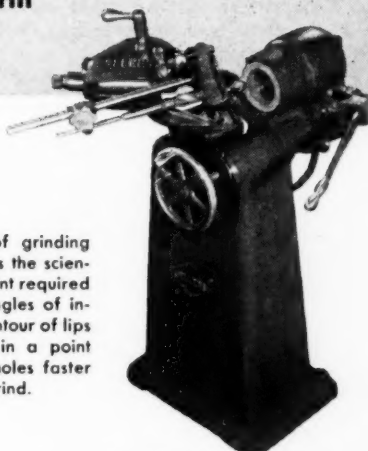
SELLERS DRILL GRINDERS

Longer drill life... More holes per grind
... Increased savings in drill cost...
Reduced drill
inventory



6-G DRILL GRINDER (WET)

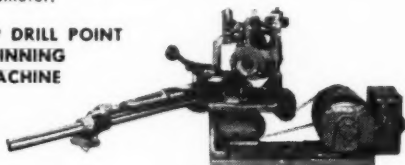
For grinding right hand 2 and 4 lip twist drills from $\frac{3}{16}$ " to 3" diameter, 3 lip drills $\frac{3}{4}$ " to 2 $\frac{1}{4}$ " diameter.



4-G DRILL GRINDER (DRY)

For grinding right hand 2 and 4 lip twist drills from $\frac{1}{4}$ " to 2" diameter, 3 lip drills from $\frac{3}{4}$ " to 2 $\frac{1}{4}$ " diameter.

GP DRILL POINT THINNING MACHINE

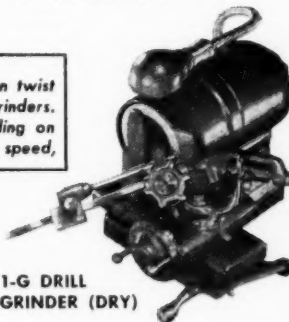


Thins and centers standard 2 lip twist drills from $\frac{1}{2}$ " to 3" diameter up to 24" in length.

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COLD SAW MACHINES
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MILLING MACHINES
DRILL AND TOOL
GRINDERS
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER
SPECIAL MACHINES

Send us six or more of your own twist drills to be ground on Sellers Grinders. Try them against any other grinding on your own work. Compare drilling speed, quality of holes, number of holes per grind. Find out the truth about drill grinding. There is no obligation.



1-G DRILL GRINDER (DRY)

Full information covering any Sellers Drill Grinder in which you are interested will be furnished upon request.

Grinds straight or taper shank right hand 2 lip twist drills from .028" (No. 70) up to 1" diameter to any included angle of point from 80° to 160°.

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CONSOLIDATED
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ROCHESTER 10, NEW YORK

amount of diamond by carat weight of the diamond section of the wheel. Wheels of a hundred concentration are recommended for machine grinding operations on cemented carbides such as chip breaker grinding, cylindrical, cutter grinding, surface and internal grinding, particularly in grit sizes up to about 220. Most peripheral type wheels, flaring cups and dish wheels come under this classification. No. 100 diamond concentration is also best suited for thin cut-off wheels, mounted wheels and hand hones.

The peripheral type wheel commonly used for fixed feed precision grinding, the reduced concentrations, particularly in the coarser grit sizes such as 100, 120 and 150, generally cause the wheel to wear too fast to be economical and a 100 concentration, therefore, should normally be used. The relatively greater number of cutting particles provided by grit sizes 220 and finer frequently permit the use of 50 concentration wheels for this same class of grinding. Metal and vitrified diamond wheels, regardless of the type or shape to be used for cemented carbide grinding, are generally made of 100 concentration. There are indications that in the relatively fine grit sizes of vitrified bonded wheels, beginning with about 220, lower priced 50 concentration wheels can be employed to advantage.

Wheels of 50 concentration are recommended for resinoid bonded cup wheels in the finer grit sizes, 220, 240, 320, 400 and 500, when used for offhand or "constant pressure" grinding. The term "constant pressure" is meant to include pressure between the wheel and the work supplied either by hand or by springs. Resinoid bonded diamond wheels of 25 concentration are recommended for these same cup wheels in the relatively coarse grit sizes, 100, 120

and 150, when used for offhand grinding of carbide tools. Regarding depth of diamonds, depending upon the bond type and wheel size, straight wheels for peripheral grinding are made with either 1/16", 1/8" or 1/4" depth of diamond measured radially, figures 11 and 12. Cup or recessed wheels for grinding on the side or rim are available with a layer of diamond either 1/16" or 1/8" deep in the case of resinoid or vitrified bonded wheels and 1/32" deep for metal bonded wheels.

Generally, new users of diamond wheels purchase wheels with thin diamond coatings because of the lower initial cost. Users who have become accustomed to the wheels, however, usually prefer the thicker diamond coatings because of the savings in the long run. The lower concentrations in resinoid bond are more efficient on operations where they can be used in that they normally will remove more carbide per carat of diamond than abrasives used. The vitrified and metal bonds are more efficient in 50 and 100 concentrations. The selection of the proper thickness of diamond coating is largely a matter left up to individual choice, but from the standpoint of wheel cost per tool grind, wheels with a relatively large depth of diamond are more desirable. Often the very small sizes of wheels are made with the diamond particles throughout the entire wheel.

References:

- Behr-Manning Co.**, Troy, N.Y.
- The Carborundum Co.**, Niagara Falls, N.Y.
- Cincinnati Milling Machine Co.**, Cincinnati, Ohio.
- Covel Manufacturing Co.**, Benton Harbor, Mich.
- Grinding Wheel Institute**, Greendale, Mass.
- Norton Co.**, Worcester 6, Mass.
- Ingersoll Milling Machine Co.**, Rockford, Ill.

Descriptions of late model tool and cutter grinders

Hammond's 10" carbide tool grinder

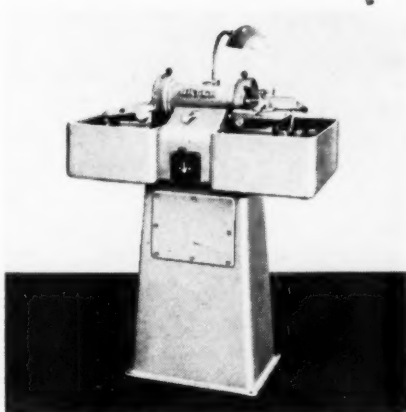
This grinder, made by Hammond Machinery Builders, Inc., Kalamazoo, Mich., is suitable for use with silicon carbide, diamond and aluminum oxide wheels. Heavy duty construction and precision oversize spindle with one double row and two single row bear-



ings assures vibrationless operation. Spindle speed of 1900 r.p.m. is obtained through multi V belt drive. Wheel flanges are ground on spindle to assure true running wheels. A machined table slot running parallel to the wheel face permits use of the compound protractor tool gage that may be adjusted to and from the wheel face to accommodate tool width. Model can be used either wet or dry.

Arter's carbide tool grinder

In the Arter Model 200 carbide tool grinder, made by the Arter Grinding Machine Co., Worcester 5, Mass., the worktable with the tool, held by hand or in a holder, is moved across the



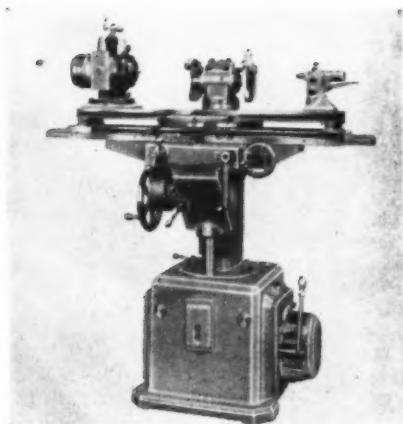
face of the grinding wheel. Tool feed is accurately controlled by screw feed to the worktable. In the same machine the chip breaker grind can be made by moving the wheel up and down. The worktable can be tilted to the angle required and the protractor type tool holder locates the tool in the correct angular relation to the wheel.

The worktable, spring tensioned, is moved fast or slow, with long strokes or short, to carry the tool across the face of the wheel. The action is similar to honing, so a fine polished surface is produced.

LeBlond No. 2 cutter grinder

On this machine, made by The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, the table—not the wheel head—swings around to give the required angle. Thus, the driving arrangement from motor to wheel head is permanent and more speeds can be delivered. An almost unlimited variety of reamers, mills, taps and cutters can be ground.

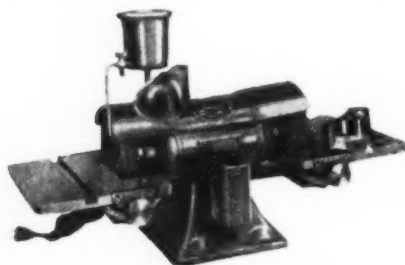
Three bearings protect the accuracy of the column; the knee is rigid with



front bearings gibbed to the column with a double angle type gib. The saddle rides towards, and away from the column on the upper crossways of the knee. All shafts and feed screws are mounted on antifriction dust-sealed bearings. All vital parts, including motors, are enclosed to assure freedom from dust and grit.

Metalmaster carbide tool grinder

This carbide tool grinder, made by Bradford Machine Tool Co., Cincinnati, O., is equipped with 6"x1½"x1½" cup



wheels and is available in both bench and pedestal type, each complete with adjustable work tables, protractor, reversing switch and bearing lock device. The machine is equipped with oversize

spindle and large sealed ball bearings. Work lamp is adjustable for either wheel and gives ample light. Work tables are accurately ground. The motors are electrically reversible, allowing grinding wheels to operate in either direction. The grinder will take standard diamond wheels.

The work tables tilt 30° upward and 45° downward. Accurate indication and scale plates indicate the desired angles.

Sellers 4-G drill grinder

This machine, made by Consolidated Machine Tool Corp., Wm. Sellers & Co. Div., Rochester, N.Y., is recommended for grinding right hand twist drills and



flat twist drills and 2, 3, or 4 lip drills up to 2". Lips are ground to equal length, angle and clearance. Clearance produced is sufficient to assure free cutting, without weakening cutting edges. The clearance is automatically determined by the machine for different sizes of drills. The machine rough and finish grinds. Rough grinding is done by taking a succession of slicing cuts, holding the chuck stationary and passing the wheel across a narrow portion

WERNER MILLERS

VERTICAL

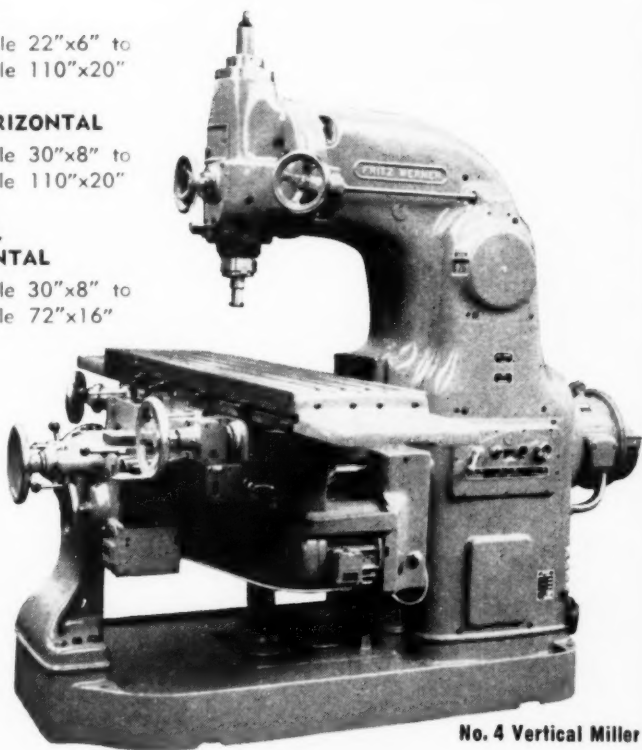
No. 0—table 22"x6" to
No. 6—table 110"x20"

PLAIN HORIZONTAL

No. 1—table 30"x8" to
No. 6—table 110"x20"

UNIVERSAL HORIZONTAL

No. 1—table 30"x8" to
No. 4—table 72"x16"



No. 4 Vertical Miller

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of the lip, turning the chuck slightly for each successive cut.

This is a self-contained dry grinder with enclosed motor, mounted on swinging head.

Covel universal tool and cutter grinder

The table of this grinder, made by Covel Mfg. Co., Benton Harbor, Mich., rides on a series of hardened $\frac{3}{4}$ " balls contained in hardened and ground ways. The base ways are two V's, while the



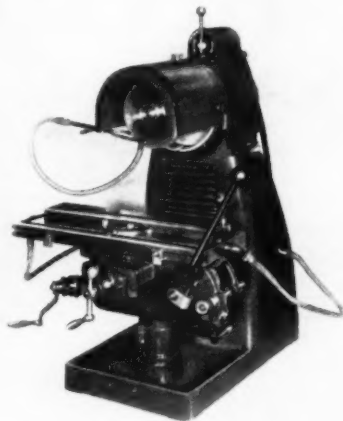
table has one V and one flat way. Fiber retainers separate the balls. The head swings on a vertical adjustable column graduated in degrees.

The precision ball bearing spindle features two sets of paired bearings with spring loading to take up wear and eliminate end play. Bearings are packed with a special grease confined by seals, assuring sufficient lubrication for the life of the bearings.

The machine is ideal for sharpening all types of milling cutters, reamers, form tools, etc. It may also be used for internal grinding operations.

Wickman-Neven Model GF-3

This model, made by The Wickman Mfg. Co., 15533 Woodrow Wilson Ave., Detroit, Mich., has a swiveling motor

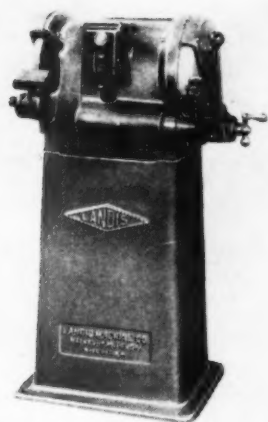


and a table with vertical, longitudinal and transverse movements. Motor is reversible. Grinding wheels are mounted directly on the ball bearing spindle or on either of two adapters which give spindle extensions of $2\frac{1}{2}$ " and $5\frac{3}{8}$ ". Wheel and motor can be accurately set in any position 20° either side of vertical center. Microscopes are incorporated on the $5" \times 17"$ table for close settings. Coolant is supplied by a centrifugal pump which delivers 12 gals. per hour.

Landis Chaser grinders

These grinders, made by Landis Machine Co., Waynesboro, Pa., are designed to grind Landis tangential chasers to the correct lead and rake angles with a minimum waste of chaser life. Grinders have built-in motors, the grinding wheels being mounted directly on the armature shaft; thus eliminating gears or other mechanical drives.

A new type of swivel head for the chaser is employed. The swivel head is



taper sleeve for holding taper shank cutters and cutter adapters. There are front and rear controls for column slide with hand wheels graduated in .001". Motor is a 1/3 h.p., 3450 r.p.m. unit with ball bearings greased for life with solid thrust bearing.

A fabricated steel cabinet with compartments for tools is available.

Gorton cutter grinder

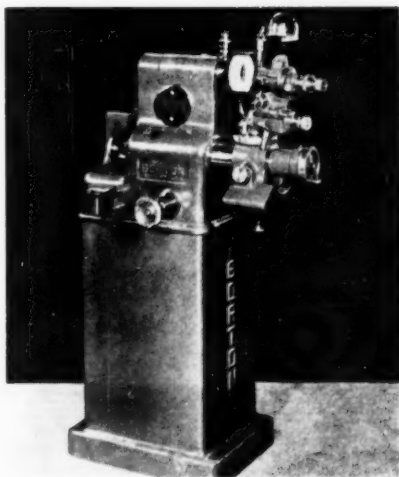
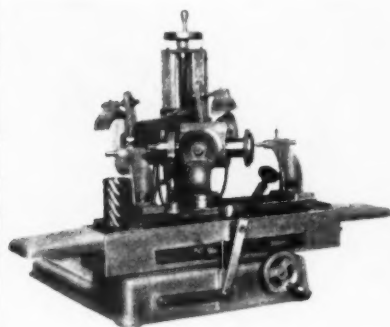
This cutter was designed to sharpen small end mills. It is made by the George Gorton Machine Co., Racine, Wis. The grinder is completely ball bearing equipped; all bearings are dust-proof and run in oil. Simple, positive adjustments for wear are provided at all vital points.

Machine will grind cutters up to 5/8" dia. shank. It will also grind cutters with 2, 3, or 4 flutes. By using diamond impregnated wheels (interchangeable with standard wheels), carbide cutters may be ground to various shapes and sizes. Spindle is of the cartridge type, quickly removable as a unit. Grinder mounts 6" cup grinding wheel. Drive is by means of a V belt from a standard 1/4 hp motor.

fully graduated so that any required degree of rake and lead may be obtained. The chaser clamping screw contacts the chaser on the dovetail surfaces in the same manner as the chaser clamp of a die head.

Minit cutter grinder

This bench type cutter grinder, made by The Minit Cutter Grinder Co., Inc., Lynn, Mass., is a small machine with all the advantages of a larger, higher priced unit. The machine has hardened and ground ways with the table riding on ball bearings, tilting wheel head and hardened and ground bushing in the universal work head. There is a



Sterling model G

This universal tool and cutter grinder, made by McDonough Mfg. Co., Eau Claire, Wis., has a rugged cast base to

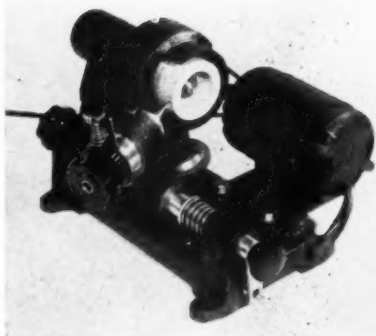


dampen vibration. Balanced table moves on flat V ways for greater accuracy. Design of centers assures exceptional grinding accuracy and permits removal of work for checking. Direct drive of grinding wheels is by balanced motor through Ex-Cell-O spindles.

Power table traverse can be added to either plain or universal machines. Internal, external or surface grinding can be done with the addition of an automatic infeed which provides a variable automatic table infeed.

New Hermes model CG2

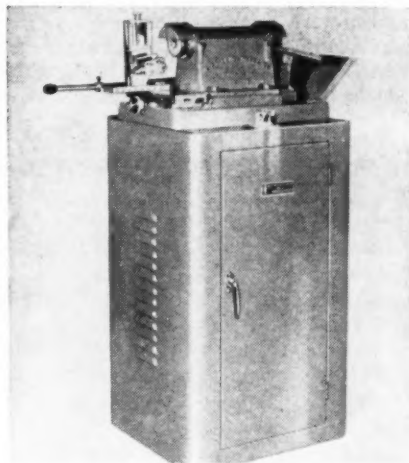
This cutter grinder is designed to grind cutters from any type of engraving or routing machine. It is made by New Hermes Engraving Machine Corp., 13-19 University Place, New York 3, N. Y. The grinder features a precision ball bearing spindle driven by a smooth, endless belt. The grinder can be mounted on the work bench next to the engraving machine. The



tool head is designed for spring collets and has a capacity of $\frac{1}{2}$ " dia. shank cutters. It is equipped with an indexing device for grinding single lip, 2-, 3-, and 4-sided cutters.

U.S. Diamond carbide grinder

The model CH-105 carbide tool grinder, made by the United States Diamond Wheel Co., Aurora, Ill., is equipped for wet grinding. It has a replaceable cartridge type ball bearing spindle engineered to run smoothly at 9,000 r.p.m. This gives a higher surface speed to smaller diameter wheels. The high surface speed on the grinding face



results in longer wheel life. A self-contained coolant system eliminates the drip pot and assures a plentiful and constant supply of coolant on the work being ground.

An all angle vise gives quick setup, no shimming of tool is necessary. A full $\frac{3}{4}$ " wide grinding wheel surface is available.

Barber-Colman combination sharpening machine

This HRS model, made by Barber-Colman Co., Rockford, Ill., sharpens a variety of hobs, cutters and reamers on both cutting edge surfaces. It will sharpen a four-pitch hob, four inches in diameter by four inches long, to class A limits.

Lead of helix, flute spacing, diameter size, periphery profile, rake angle—all of these design elements of a tool are under mechanical control. All adjustments of the machine can be positively



duplicated to produce uniformity of sharpening on any number of pieces.

Various milling cutters, plain or form-relieved type, that come within the range of the machine for face and profile sharpening can readily be ground to new accuracies. Wet grinding is a standard feature of the machine.

Specifications of American built tool and cutter grinders

| Minit Cutter Grinder | | Lexington 73, Mass. | | |
|-------------------------------------|----------|---|--|---------------------------------|
| Type and Model | Table | Table Travel | Travel | Horsepower and Speed |
| Cutter Grinder Bench Type | 5" x 20" | 9" longitudinal; 9 $\frac{1}{2}$ " swing over table; 15" between centers | Column travel, 8"; Vert. travel wheel head, 7" | $\frac{1}{2}$ h.p.; 3450 r.p.m. |

| McDonough Mfg. Co. | | Eau Claire, Wis. | | |
|---|--|--|----------|---|
| Type and Model | Capacity | Wheels or Range | Table | Horsepower and Speed Remarks |
| Drill and Carbide Tool Grinder Model DA Floor Type | $\frac{1}{8}$ " to 2 $\frac{1}{2}$ " drills; std. lip angle, 59°; 2, 3, 4 lip drills | One 6" dia. x 1 $\frac{1}{2}$ " x 1 $\frac{1}{2}$ " hole cup wheel; One each 6" sil. carbide cup wheels | 5" x 9" | $\frac{1}{2}$ h.p.; 3450 r.p.m. |
| Tool and Cutter Grinders | Face Mills on Work Head, 10 $\frac{1}{4}$ "; Saws on table, 38" | Long. table travel, 20 $\frac{1}{2}$ "; cross travel, 8"; swivels, 180°; vert. movement of wheel spindle, 8 $\frac{1}{2}$ "; max. C.I.L. spindle to top of table, 11 $\frac{1}{4}$ " | 5" x 36" | 1 h.p.; 3450 r.p.m. Company makes a plain and a universal tool cutter grinder. |

Hammond Machinery Builders, Inc.
Kalamazoo 54, Mich.

| Type and Model | Wheel Size Capacity | TS=Table Size TT=Table Travel | H.P. and Speed | Remarks |
|---|---|----------------------------------|---|---|
| Wet Chip Breaker and Diamond Finishing Grinder Model CB-77W | 6" or 7" dia. cup wheels; tools up to 2"; 8" max. stroke | TS=8"x14" | $\frac{3}{4}$ or 1 h.p.; 3500 r.p.m. | Model CB-77W has constant flow of coolant. Model CB-77 has dripfeed tank. |
| Chip Breaker Grinder Model C-4 | 4" dia. wheels; tools up to 2"; | TT=6 $\frac{1}{2}$ " | $\frac{3}{4}$ h.p.; 3500 or 2900 r.p.m. | Available in bench or pedestal models. |
| Carbide Tool Grinder Model 7 | 6" or 7" dia. cup wheels; 6"-1" or 7"-1 $\frac{1}{2}$ " max. face | TS=8"x14" | $\frac{1}{2}$ h.p.; 3450 r.p.m. | Available in bench or pedestal models. |
| Model D-10-B Dry | 10" dia. cup or straight wheels; 1 $\frac{1}{8}$ " face width | TS=10"x19" | 1 or 2 h.p. | Model D-10-SB dry is similar to Model D-10-B double cup wheel, except D-10-SB has straight wheel construction on left-hand end. |
| Model WD-10 Double cup wet or dry | do | do | 1 h.p.; 1900 r.p.m. (2 h.p. available) | Model WD-10-S is same as WD, except it has straight wheel construction on left-hand end. |
| Model 14-WD | Two 14"x4"x1 $\frac{1}{2}$ " face | TS=Two 12"x22" | 3 h.p.; 1350 r.p.m. | Also available in Models 14-D and 14-SD. These have same specs as 14-WD and 14-SWD, except they are dry. |
| Model 14-SWD | One 14"x4"x1 $\frac{1}{2}$ " face; one 14"x2" face. | TS=one 12"x22"; Two 8"x8" | do | do |

The Wickman Mfg. Co.
Detroit 3, Mich.

| Type and Model | Wheel Size | Table Size and Adjustment of Table | Horsepower | Remarks |
|--|---|---|---------------------|---|
| Carbide Lapper and Grinder Model GF-2A Bench | 6"x1 $\frac{1}{4}$ "x $\frac{5}{8}$ " rim. | 8"x12"; 5° above horizontal, 15° below horizontal | 1 h.p. | Company also makes a model GF-2, same as GF-2A, which will accommodate silicon carbide as well as diamond wheels. |
| Model GF-3 | Wheels mounted directly on 1 $\frac{1}{4}$ " ball bearing spindle. Adapters give spindle extensions of 2 $\frac{1}{2}$ " and 5 $\frac{1}{2}$ ". | Table has vertical, longitudinal and transverse movement; 5"x17" table. | 1 h.p.; 2850 r.p.m. | Use for tool, chipbreaker or surface grinding. |

YOU GET *SPEED* PLUS ACCURACY WITH

MOORE JIG BORERS

IN THE TOOLROOM

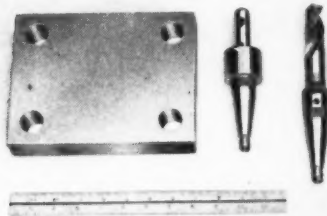
400 holes to "tenths"—5 to 7 minutes each on the No. 1 Moore Jig Borer



Manufacture of this group of drill jigs involves accurately locating, drilling and boring approximately 400 holes. The No. 1 Moore Jig Borer finished them to "tenths" in from five to seven minutes per hole.

ON PRODUCTION

64 holes to $\pm .0002$ "—2 minutes each on the No. 2 Moore Jig Borer



Sixteen pieces like this were located, drilled, bored and checked on a No. 2 Moore Jig Borer with one drill and one carbide bit. The 64 holes were finished in 2 hours and 8 minutes (plus 30 minutes setup) with location and size tolerances $\pm .0002$ ".

Only a precision machine geared to the high American production standards of ruggedness and accuracy can meet these performance requirements. For versatility and speed in spotting, drilling, reaming, boring and checking operations in production as well as tooling, no other moderately-priced machine tool compares with the Moore Jig Borer. And there's no sacrifice of accuracy for speed, since the lead screw measuring system built into each Moore machine permits working to the closest of tolerances.

You'll find that the Moore Jig Borer can pay for itself—in *jig time*. Write today for detailed bulletins.

Moore Special Tool Company, Inc.
726 Union Avenue, Bridgeport 7, Conn.

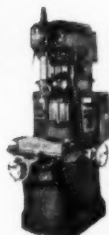
NO. 1 MOORE JIG BORER

Table working surface of 10"x16". Over 1200 now in use throughout the world. The ideal small, accurate jig borer. Lead screws accurate to .0002" in 16".



NO. 2 MOORE JIG BORER

Table working surface of 19"x19". Heavier cuts, larger holes. Features infinitely variable spindle speeds, three power feed ratios, centralized control panel.



ADD TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

see our catalog in
**MACHINE
TOOL
CATALOG**
or write for copy

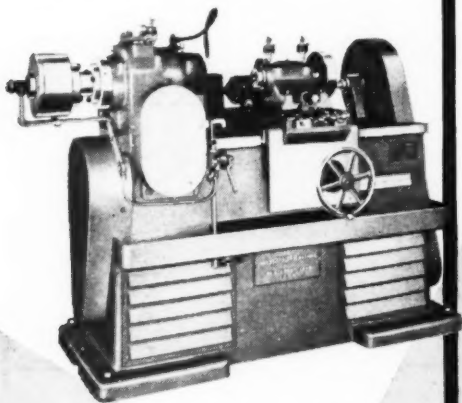
| Barber-Colman Co. | | | Rockford, Ill. | |
|---|--|---|---|-------------------------------------|
| Type and Model | Capacity D = Dia. of Hob F = Depth of Face L = Length of Hob | Wheels Taper | Wheel Adjustment | Horsepower and Speed |
| Hob Sharpening Machine No. 4-4 | D=4"; G = 7/8"; L=4" Figures are approximate. Exact capacity depends on pitch, depth of cut, etc. | 7" max. dia.; No. 8 B&S | Angle, r. or l.h.=30° Sine bar, r. or l.h.=25° Lead=20" | 1 1/2 h.p.; 3600 r.p.m., spindle |
| No. 6-5 | D=6"; F = 7/8"; L=5" | 7" max., 5 1/2" min. dia. taper, 1 1/4" dia., .750" taper per foot | Angle, r. or l.h.=30° Rake, pos. or neg.=1° Vertical=5" | 2 h.p.; 3600 r.p.m., spindle |
| No. 10-12 | D=10"; L=12" | 6 1/2"; Arbors=1 1/4", 1 1/2", 2"; No. 11 B&S | Angle, r. or l.h.=40° Lead=27° Table Travel=18" | 2 h.p.; 1800 r.p.m. spindle |
| Combination Sharpening Machine for Hobs, Reamers, Cutters No. HRS | Profile sharpening =8" Face sharpening =6" | 5" dia. x 1 1/2" x 1 1/4" hole x 3/4" x 1/4" rim for profile. 7" x 3/4" x 1 1/4" for face sharpening | Stroke length =20" straight; 8" helical. 33" between centers Lead=6" min.; Angle, r. or l.h.=30° | 1 h.p.; 3000 or 5000 r.p.m. |

| George Gorton Machine Co. | | | Racine, Wis. | |
|--|--------------|--|-----------------------|--|
| Type and Model | Wheel Size | C=Capacity W=Working Space | Horsepower and Speed | Remarks |
| Cutter Grinder 375-3 Floor Type | 6" cup wheel | Grinds cutters up to 5/8" dia. shanks and 2, 3, 4 fluted cutters. | 3/4 h.p.; 1725 r.p.m. | Tool heads furnished separately for different grinding operations. |
| 265-6 Bench Type | 4" cup wheel | C=Grinds cutters up to 5/8" dia. shanks. No multi-flute grinding. W=16"x22" | do | do |

| United States Diamond Wheel Co. | | Aurora, Ill. |
|-------------------------------------|---|--------------|
| Carbide Tool Grinder | Company makes three models, No. CH-105A, for grinding offhand clearance angles and chipbreakers; No. CH-105B, double end machine for grinding clearance angles on both ends; No. CH-105C, single end machine for grinding clearance angles on one end. All models have 1/2 h.p. motor, 9000 r.p.m.; wheel size, 3" and 3 1/2"; grinding wheel surface, 3/4" wide. Grinds tools to 1" shank. | |

*the only solution to
high thread production costs . . .
install a fully automatic*

Model "H1" — for precision, internal, external, right and left hand threads.



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better . . . faster, AUTOMATICALLY*

The ^{James} Coulder Machine Co.

637 Railroad Ave. Bridgeport 5, Conn.

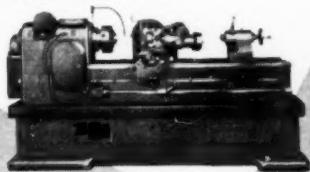
Model "L1" — For long, precision, square, standard and 29 degree threads. Internal or external.



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COULDER has been building production machines since 1896. Every new development for faster, more accurate threading created by engineers with immense experience, background and know-how is incorporated on all Coulder Threading Machines. That is why COULDER is the most respected name in machinery the world over. If you are confronted with a thread production problem, please write or phone . . . COULDER engineers will help you. Catalogs and specifications of machines are available at no cost.

"THREADMASTER" — For precision, long and short traversing, elevating, cross feed and lead screws.



The R. K. LeBlond Machine Tool Co.
Cincinnati 8, Ohio

| Type and Model | Capacity | Range | Table | Horsepower and Speed |
|--------------------------------|--|---|---------------------------------------|--------------------------------|
| Cutter Grinder No. 2 | Centers swing 10", will take 28" between centers. Takes cutters 17" dia. Grind saws and cutters on radial faces 36" dia. | Longitudinal table movement 28" (handfeed), 26" (powerfeed). Vert. movement 9" cross movement 8". | Swivels 180° Work surface, 76" x 42". | ¾ h.p. wheel head, 3450 R.P.M. |

Landis Machine Co.
Waynesboro, Pa.

| Type and Model | Capacity (Width of chasers) | Wheels S—Straight C—Cup | Horsepower and Speed | Floor Space |
|----------------------------------|-----------------------------|--|-------------------------------|--------------------|
| Chaser Grinder Model 0 | ½" to 1¼" r.h. | S=7" dia. x ½" face x ¾" bore C=6" dia., 2" face, ¾" bore, 5" co-bore 1½" deep. | ½ h.p. 3000 or 3600 r.p.m. | 23" x 15½" x 45½" |
| No. 1 | ¾" to 2¼" r.h. | S=12" x 1" x 1" C=12", 2½", 7", 9", 1½" | 1 h.p. 1725 to 1425 r.p.m. | 29½" x 21½" x 48½" |
| No. 1½" | 1" to 4½" r.h. | S=12" x 1½" x 1" C=12", 2½", 7", 9", 1½" | 2 h.p. 1725 to 1425 r.p.m. | 45½" x 35½" x 48½" |

The Bradford Machine Tool Co.
Cincinnati, Ohio

| Type and Model | Cup Wheel Size | Straight Wheel Size | HP—Horsepower and Speed HC—Height to Centerline of Spindle | Size of Base |
|--|-----------------|---------------------|---|--------------|
| Carbide Tool Grinder Model 260—1 h.p. Pedestal type | 10" x 2½" x 1½" | 12" x 1½" x 1" | HP=1; 1800 r.p.m. HC=37" | 14" x 15½" |
| Model 260—2 h.p. Pedestal type | 12" x 4" x 1½" | 12" x 2" x 1½" | HP=2; 1800 r.p.m. HC=38" | do |
| Model 690B Bench type | 6" x 1½" x 1½" | — | HP=½; 3450 r.p.m. HC=7" | — |
| Model 690B Pedestal type | do | — | HP=½; 3450 r.p.m. HC=40" | — |

New Hermes Engraving Machine Co.
New York 3, N.Y.

| | |
|-----------------------|---|
| Cutter Grinder | Machine sharpens engraving and routing machine cutters. Capacity of ½" dia. shank cutter; single lip, 2, 3 and 4 sided cutters. |
|-----------------------|---|

Consolidated Machine Tool Corp.**Rochester 10, N.Y.**

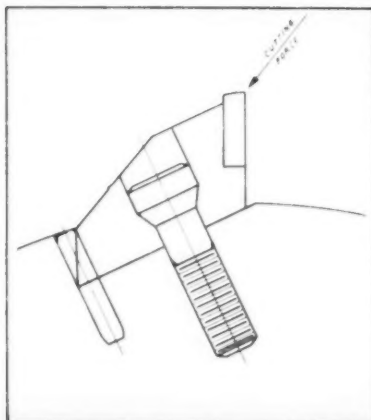
| Type and Model | Capacity | Wheels | Horsepower and Speed | Remarks |
|---|--|--|----------------------|--|
| Drill Grinder (Wm. Sellers) No. 1-G | .028" (No. 70) to ½" dia. Angle from 80° to 160° | 5" cup type | ¾ h.p. | Available in bench or floor type models. Specs. same for both |
| No. 4-G | 2, 3 or 4 lip drills up to 2"; 2 or 4 lip drills up to 3"; 3 lip drills up to 2½"; Angle from 60° to 160° | 6" cup type | 1 h.p. | Floor model |
| No. 6-G | Twist drills ⅝" to 3" dia. Angle from 60° to 160° | 8" cup type | 2 h.p. | Floor model |
| Tool Grinder No. 4-T | For tool bits from ¼" square up to 1½" x 2" | 1-15" dia. x 1½" or 1-15" dia. x ¾" | 3 h.p. | For grinding single point lathe, planer, shaper, boring tools; h.s.s. or carbide |
| No. 5-T | Shanks up to 2½" x 2" | 24" dia. vertical slide adjustable from 0" to 4" | 5 h.p. | When supplied with chuck for shanks up to 3" x 3". This model is known as 6-T |
| Drill Point Thinning Machine Bench Type | Machine is for thinning and centering standard two lip twist drills from ½" to 3" dia. and up to 24" long. Drive is by ½ h.p. motor. | | | |
| No. 10-G | 2 and 4 lip drills 1¼" to 5" dia. Angle from 90° to 140°. Also 3 lip drills from 1¼" to 4½" dia., and celfor flat twist drills from 1¼" to 5" dia. | 14" dia. cup type | 5 h.p. | |

Arter Grinding Machine Co.**Worcester 5, Mass.**

| Type and Model | D=Dia. of Grinding Wheel R=Rim Width of Wheel H=Hole Size of Wheels | Size of Largest Tool Shank Held, Width x Height | S=Size of Work Table H=Horizontal Table Travel I=In. Feed of Table | T=Tilt of Table, Down and Up S=Peripheral Speed of Wheel |
|--|---|---|--|---|
| Carbide Tool Grinder Model 200 | D=6"; R=¾"; H=1½" | 1½" x 1½" | S=16½" x 7¾" H=2¼"; I=.030" | T=20° and 7° S=6000 ft. |

MILLIT the Latest Discovery

in Milling Cutters



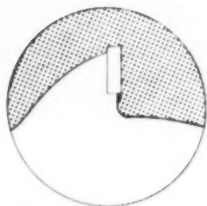
Millit has discovered a way, for the first time, to produce a fully backed up inserted blade cutter.

How? By proving that forces on a cutting blade tend to be in a downward, not in an upward direction.

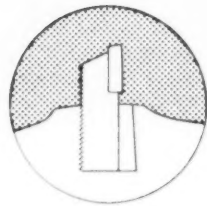
Thus there is *no* need of the wedged anchorage for blades as found in the conventional inserted blade cutter.

There *is* need for a strong body abutment built directly in back of the cutting tooth. This abutment is the radically different feature of the new Millit!

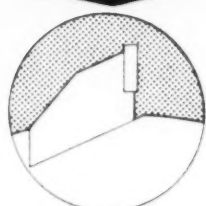
Discover the Advantages of MILLIT



Here's a Solid Body Cutter
No replaceable blades
Throw away costs high



Here's an Inserted Blade Cutter
Lacks tooth rigidity
Frequent regrounding necessary



And Here's the Millit
Replaceable blades
Rigid tooth back up
Cuts longer between grinds



Millit Div.
Kraus Design, Inc.
35 Flint Street
Rochester 8, New York

Millit allows no cantilever deflection because it's fully backed up, yet it has all the economical advantages of the inserted blade cutter! Discover the advantages of Millit. Write today for more details.

Shop HINTS



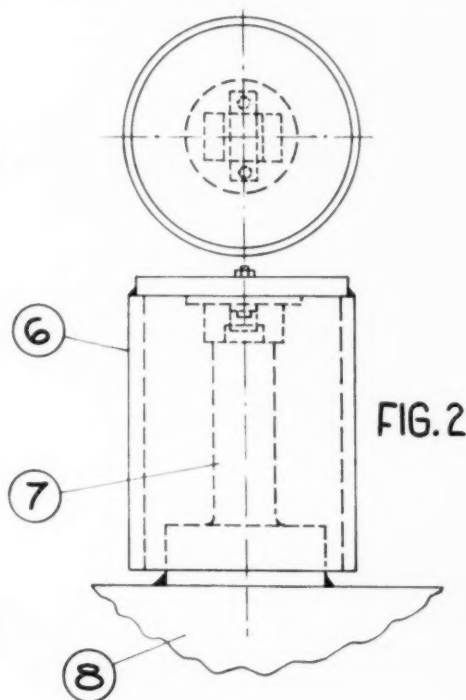
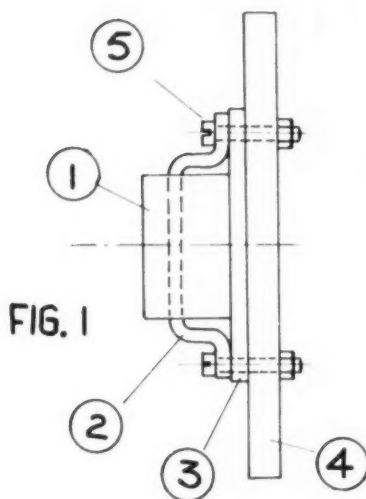
Magnetic Protector Features Quick Action

by H. G. Frommer

LARGE weldments, before being delivered to the assembly floor, usually undergo a shot blast operation with subsequent paint spraying. Occasionally, some component part of such a weldment must be protected from either blasting or painting or both. Masking the part with a heavy-duty tape is one

solution, but labor and material costs make it prohibitive.

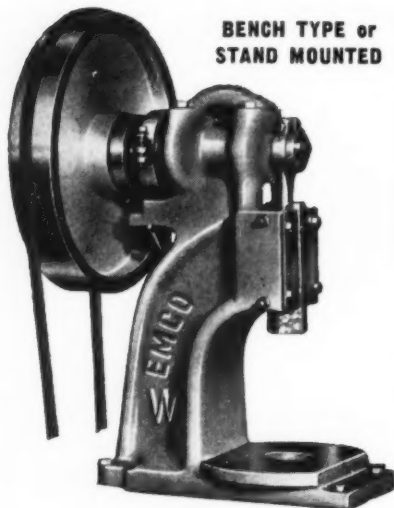
To overcome the cost angle, a magnetic protector that can be fastened and unfastened instantaneously was devised. Bearing pin (7), part of a large weldment (8), had to be protected from shot blasting and painting. Horseshoe type



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TO
INDUSTRY

**KLAAS MACHINE
& MFG. CO.**
4346 East 49th St.
Cleveland 25, Ohio

KLAAS-BUILT

"Alnico" magnet (1) was strapped to a circular steel disk (4). To prevent a magnetic short circuit that would weaken the holding power considerably, a brass strip (2) and brass screws (5) were used to mount the magnet. A brass washer (3) separates the magnet from the steel disk. A length of steel pipe (6) is then welded to the disk (4).

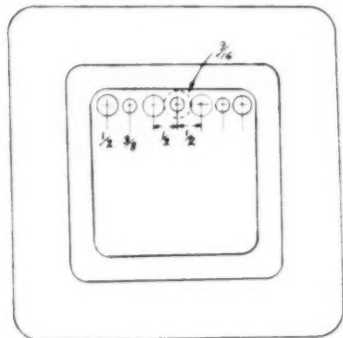
The operation, of course, is very simple and requires little time. Because of this fact, it was found that it was easier to remove the protector after blasting and fasten another one at the paint booth. Therefore, only two protectors are needed, even for the highest production requirements.

Removes center slugs from blanking dies

by H. F. Ehrich

A method for removal of center slugs from blanking dies I have found very

ALTERNATE METHOD OF REMOVING SLUGS FROM DIES



1" DRILL $\frac{3}{8}$ " DIA. ALTERNATE HOLES ON $\frac{1}{2}$ " CENTER



END USE STD $\frac{3}{8}$ " SPIRAL FLUTE COUNTER BORE WITH $\frac{3}{8}$ " PILOT TO REMOVE WEB
NOTE: SIZES OF DRILLS & COUNTERBORES MAY BE LARGER OR SMALLER DEPENDING ON THE SIZE OF SLUG TO BE REMOVED

effective follows: lay out centers on $\frac{1}{2}$ " spacing; drill alternate holes $\frac{3}{8}$ " and $\frac{1}{2}$ "; remove webs using a standard $9/16$ " spiral flute counterbore with $\frac{3}{8}$ "

pilot. This allows the slug to fall free of the ring with no effort. The sizes of the drills and counterbores can be varied to suit the size of the die to be made.

This method utilizes standard tools which are found in any shop and makes it unnecessary to use plugs or tapered reamers. It will speed up the work, as all this can be accomplished without turning the die block over.

Ring area chart

by W. F. Schaphorst, M.E.

Only two dimensions are necessary to determine the area of any ring—the width of the ring, W , as shown in the sketch, and the distance, D , also shown in the sketch. But notice carefully that the distance D is not the outside diameter, nor is it the inside diameter. It is the distance from the inside edge to the farthest outside edge.

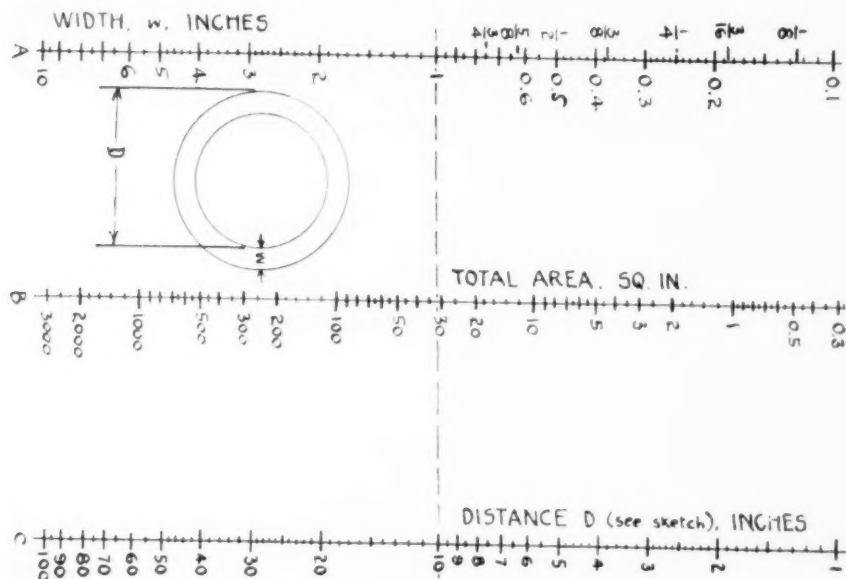
To use the chart simply run a straight line through the width W in column A and the distance D in column C, and the intersection with column B instantly

gives the area of the ring.

Thus, for example, the dotted line drawn across the chart shows that if the width W is 1", and if the distance D is 10", the area is a little over 30". Estimating with the eye and reading the scale in the same way that you read a thermometer, it is evident that the area is very close to 31 sq. in.

If the figures on the chart are not large enough to take care of your problem, simply add ciphers. For example, if the width W is 100" and the distance D is 1000", the same dotted line will solve the problem. Two ciphers are added in column A and two in column C, making a total of four ciphers. Therefore, simply add four ciphers to the result in column B. The answer is 310,000 sq. in.

Similarly if the figures on the chart are too large, shift the decimal point over to the left in columns A and C. Then in the "answer" shift the decimal point to the left as many digits as shifted to the left in column A plus digits shifted in C. For example, if W is .01" and D is 0.1" the area is 0.0031 sq. in.



Soft collet pads make good nests

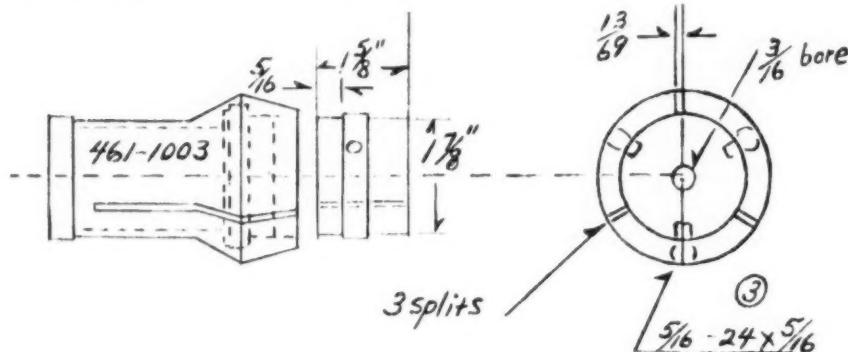
By Harold D. Rhodenbaugh

Why make elaborate and expensive fixtures for nesting small parts on your screw machine? Soft collet bushings in many instances make ideal and inexpensive nests, especially in aircraft instrument production.

Where application is practical, they

surpass the soft jaw chuck. Like the soft jaws on a chuck, they can be C bored, faced and/or formed. They are inexpensive to make, and since collets operate much faster than chuck jaws, they are an asset to production not to be overlooked.

Their practical application should be considered only where light finishing cuts are required.



767 STANDARD SIZES OF MARSHALL STEEL PRECISION GROUND FLAT STOCK

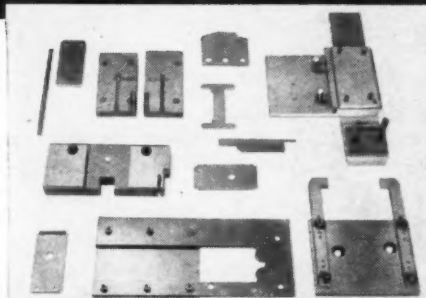
The world's largest range of sizes of precision ground tool steel in three grades are available, ready for immediate shipment and the layout bench.

WATERcrat: A fine grained electric furnace high carbon tool steel. It has been wet ground to remove all bad surfaces and to assure velvet finish of virgin metal.

OILcrat: An outstanding product of careful handling assures you of a fine grained electric furnace oil hardening ground flat stock ready for the layout bench.

AIRcrat: This air-hardening tool steel shows less size change and offers a greater safety in hardening than either of the other grades. Box 108-B

Write for descriptive literature, catalog of sizes and prices.



MARSHALL STEEL CO.
LA GRANGE, ILLINOIS

The Aristocrats of Ground Tool Steel

Soft collet bushings can be made and stocked for adaptable production runs in the hand screw machine department.

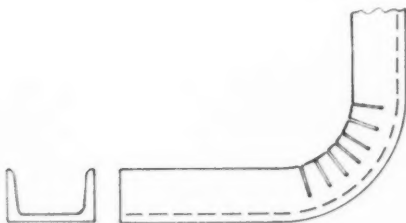
Spiders are not required in boring or counter-boring soft collet bushings. However, care must be taken in adjusting master collet tension, holding .010 to .020 under location diameter of part to be nested. It is possible to bore and counter-bore these soft bushings to hold concentricity within .0003 to .0005 on production runs.

Channel bending made easy by Walter Struck

It is almost impossible to curve small or lightweight channels without some kinks or other distortion unless costly tools or dies are used.

To achieve an acceptable bend of good appearance, small wedge-shaped sections can be cut out of the channel legs. This is done by bandsawing or, on heavier channels, by flame-cutting.

If done properly, the cutouts will



close up after bending and will hardly be noticeable. If necessary, they can be welded and ground for faultless appearance.



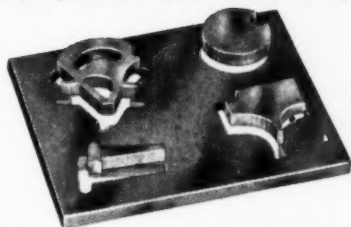
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For Cutter, Cylindrical
and Surface Grinders

For Cooler, Check-free Grinding use **NEWMAN DRESSERS**

Models for every type of wheel dressing. Proven best for dressing diamond wheels. Replacement wheels available for all models.

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Intricate curves call for more than a blade of flawless precision — complex contour cutting requires a band saw of lasting STAMINA! Teeth of maximum hardness... strong, yet flexible, stock... correct heat treating — all are essential in producing a contour band that not only cuts — but keeps on cutting! Atlantic saws are the production-increasing result of advanced design, materials and technical skills — Atlantic "extras" that payoff in production with more work per blade!... slashed downtime!... increased output!

For 30 years Atlantic's facilities have been devoted exclusively to producing constantly improved blades. In the complete Atlantic line, there's a quality blade for every material, every job.

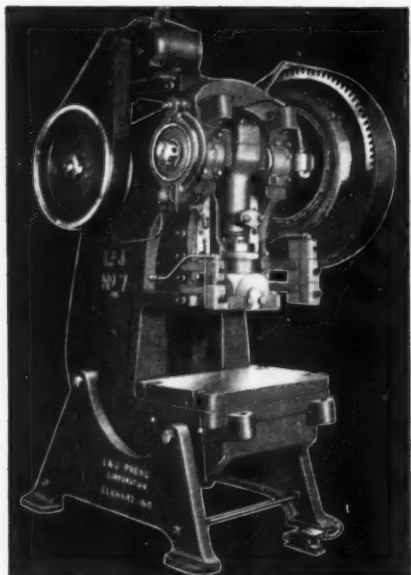
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Atlantic

ATLANTIC SAW MFG. COMPANY, Inc.
BREWERY STREET New Haven, Connecticut



L&J PRESSES

MORE PRODUCTIVITY AT LOWER COSTS

The accuracy and productivity of an L&J No. 7 (80 ton) Press plus the advantages of an L&J Fawick Air Clutch* give you an ideal combination for reducing costs and improving quality of your press work. It permits maximum speeds plus greater safety and shock-free, full-power operation.

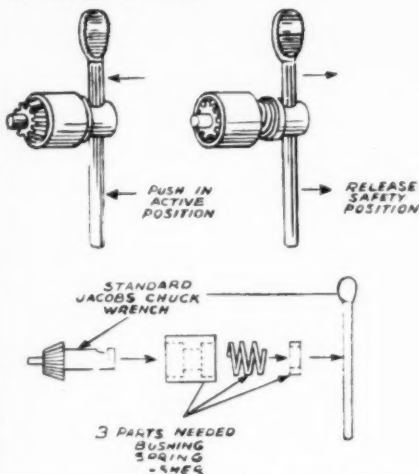
*Trouble-free because of no end thrust, no springs, no keys, no shifting parts. Pneumatic clutch element on flywheel constricts to grip drum on crankshaft flange.

6 to 80 ton models. Write for literature.



Safety chuck wrench

By Frederick Barker



Here are plans for a safety chuck wrench that can be made from any chuck wrench of this type. As soon as the drill press operator finishes tightening the chuck and lets go of the wrench the spring pressure forces it to pop out, thereby eliminating the source of many accidents.

Emergency point for lathe

by Federico Strasser

In case you cannot find your standard lathe-points, you can rapidly improvise one which does an excellent job in turning light work.

Take a standard drill press chuck (with Morse shank) and put it in the tailstock (or "nose," as the case may be) and secure in the chuck a piece of hardened drill rod of suitable diameter ($\frac{3}{8}$ " is very adequate) with a ground point of 60° included angle.

Safety in air cleaning

Air cleaning of parts before assembly is a vital operation at the C. A. Norgren Co., manufacturer of pneumatic products in Englewood, Colo. Small metal chips and other foreign particles can seriously impair the performance of their air line lubricators, air pres-



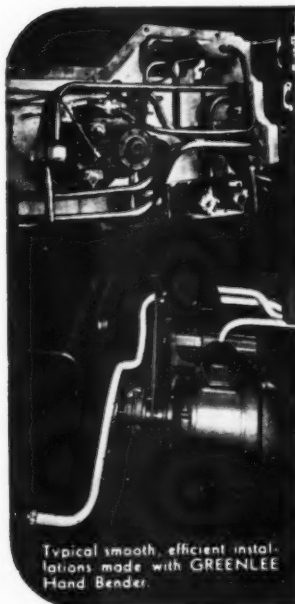
sure regulators and other precision air control valves. So, air blowguns are used extensively in Norgren assembly operations.

Through the company's employee suggestion system, an assembly worker named Eugene O'Mara submitted a valuable idea that prevents eye injuries on air cleaning operations. He took one of the plastic baffle plates which are used on air line filters and attached it between the body and the removable tip of a blowgun. The clear plastic plate not only deflects flying particles away from his eyes but it enables him to see the part he is cleaning. It is also easier to install these plates on the blowguns than it is to get workers to use goggles when air cleaning parts.

Broom handle adapter

A broom handle adapter designed by R. A. Weaver, janitor leadman at Texas Eng. and Mfg. Co., Inc., Dallas, Tex., not only is eliminating a high percentage of the broom handle breakage at the plant, but in addition permits reuse of the broken handles when breakage does occur.

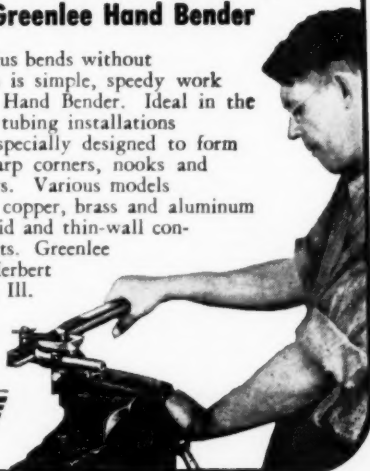
The adapter consists of a piece of



Typical smooth, efficient installations made with GREENLEE Hand Bender.

SMOOTH, accurate small-radius bends made quickly in pipe, tubing, conduit with Greenlee Hand Bender

Forming small-radius bends without flattening or kinks is simple, speedy work with a GREENLEE Hand Bender. Ideal in the shop for pipe and tubing installations on machines . . . especially designed to form neat bends for sharp corners, nooks and other close quarters. Various models and sizes for steel, copper, brass and aluminum tubing or pipe, rigid and thin-wall conduit. Write for facts. Greenlee Tool Co., 2004 Herbert Avenue, Rockford, Ill.



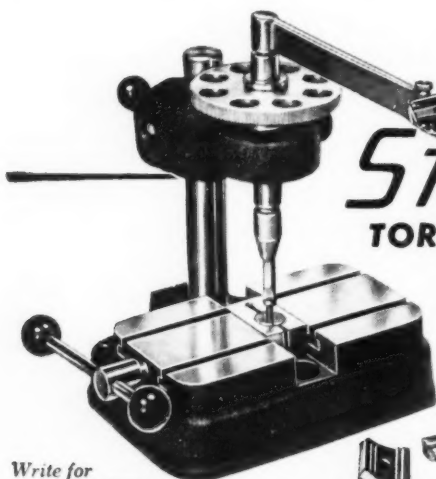
aluminum bar stock about 6" long and 1½" in diameter, one end of which is hollowed out to provide a tube 3½"



long with a 15/16" inside diameter to accommodate the broom handle. The other end is threaded with a standard broom thread to screw into the broom.

Special stencil for compass dials

Painting dials for B-16 type compasses has become a simple operation at Temco Aircraft Corporation's over-



STURTEVANT

TORQUE TESTING FIXTURE

FOR TESTING Screws, thread-cutting and thread-forming screws — all types of threaded fasteners; threaded parts and threaded connections.

**FOR MANUFACTURERS
DESIGNERS
INSPECTORS
TOOL ENGINEERS
LABORATORIES** and for
PRODUCT CONTROL
in assembly.

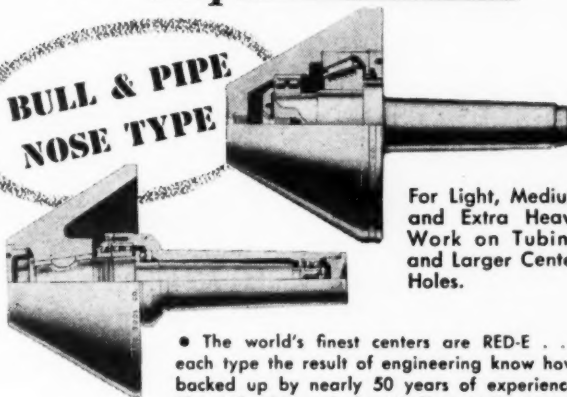
Write for
Bulletin TTF

P.A. **Sturtevant Co.**
ADDISON **QUALITY** ILLINOIS

Capacities: (0-200 in. lbs.) or (0-150 ft. lbs.)

only RED-E Anti-Friction CENTERS are Superaccurate!

**BULL & PIPE
NOSE TYPE**



For Light, Medium
and Extra Heavy
Work on Tubing
and Larger Center
Holes.

• The world's finest centers are RED-E . . . each type the result of engineering know how, backed up by nearly 50 years of experience. The "Shank" and the "Ball & Roller" Type centers illustrated are just a few of over 200 exclusively designed centers available.

Ask for Catalog "B" (Pipe and Bull Nose Centers). "C" (Anti-Friction Centers). "D" (High Speed—Carbide Tipped Centers).

CENTER Specialists Since 1908



READY TOOL COMPANY

550-B-Iranistan Ave.

Bridgeport 5, Conn.



haul division at Greenville, Tex., with the development of a special stencil in the Temco-Dallas engineering and tooling departments.

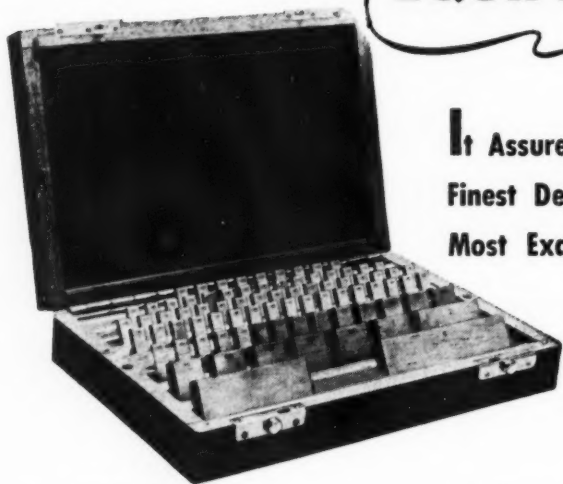
The dial of the B-16 compass is in the form of a truncated cone with the degree marks on the side. Due to its shape, the dial does not lend itself to normal painting operations. Markings on such an instrument must be accurate, as the slightest error could re-

sult in faulty navigation. Painting the dials by hand, as was formerly done at Temco, is a difficult and expensive operation. The conical stencil makes painting the dials with a spray gun practical. The hollow cone stencil fits over the face of the dial, which is mounted on a swivel base. The stencil and dial are then rotated by means of a knurled knob at the apex of the stencil while the paint is sprayed on with an ordinary spray gun.

For Extreme
Accuracy →

You Can Depend on

JOHANSSON GAGING EQUIPMENT



It Assures You Precision to the
Finest Degree, — to Meet Your
Most Exacting Requirements —

Backed by the Name
Supreme in the World
of Measurement.

- **GAGE BLOCKS**
(JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant.
- **INTERNAL INDICATORS**
(or inside measurements .155 to 24 inches) Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001

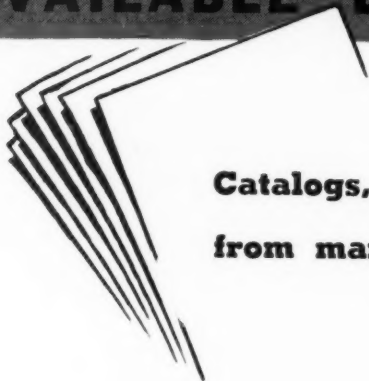
- **MIKROKATOR**
(Amplifier — for outside measurements) Graduations .0001 to .000002 or .001 M to .0002 M
- **OTHER JOHANSSON PRODUCTS**
Micrometers, Snap gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators

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AVAILABLE LITERATURE



Catalogs, bulletins available from manufacturers

1. To acquaint aircraft and allied industries with Vard-designed facilities, Vard, Inc., Dept. BB, 2981 E. Colorado St., Pasadena 8, Calif., is offering an illustrated brochure to the industry. The firm is one of the few companies which design, develop and produce all their own products—ball screw assemblies, worm gears, fractional h.p. motors and other aircraft components.

2. "Houghton Products Meeting Government Specifications." Classifications include rust preventives, lubricants, cutting oils, metal-working aids, leather and synthetic rubber products. E. F. Houghton & Co., Dept. BB, 303 W. Lehigh Ave., Philadelphia 33, Pa.

3. How to cut down over-all costs and shorten annealing cycles are explained in Bulletin GEA-5797. Using a picture-story technique, Bulletin GEA-5912, on "Heat-Treating Equipment for Aluminum," describes the process of solution heat treating, annealing, aging and stabilizing of aluminum. General Electric Co., Dept. BB, Schenectady 5, N.Y.

4. "Engineering Highlights of 1952" is a report of the significant engineering achievements of Westinghouse during the past year. This review of recent activities of its scientists and engineers is available from Westinghouse Electric Corp., Dept. BB, Pittsburgh, Pa.

5. A summary of Flexloc locknut features is contained in Form 866, issued by Standard Pressed Steel Company, Box 606, Jenkintown, Pa. A companion bulletin, Form 868, lists features of the Hollowell steel shaft collars, which are fitted with the self-locking socket set screw.

6. A constant weight-of-air circulation at all temperatures is claimed for the Con-Wate oven by the Blue M Electric Co., 306-308 West 69th St., Dept. BB, Chicago 21, Ill. This and other control features are topics of discussion in Bulletin No. 321, which should appeal particularly to laboratory people and technologists.

7. Bench and floor-type lathes in the quick-change gear and toolroom models are shown in Catalog No. 5216 by the South Bend Lathe Works, 425 East Madison St., Dept. BB, South Bend 22, Ind. Illustrations of the machines are supplemented with construction data and specifications.

8. In "Taps and Dies for Unified and American Screw Threads," Catalog No. 17, Pratt & Whitney, Dept. BB, West Hartford 1, Conn., presents its line of high-speed steel commercial ground thread taps made to the new commercial ground high limit specifications.

A good coolant pump plus a good machine tool = FASTER, BETTER PRODUCTION FOR YOU



Photo Courtesy Boye & Emmes
Machine Tool Co.

**RUTHMAN
GUSHER
COOLANT PUMPS**



This Boye & Emmes Heavy Duty Engine Lathe is equipped with a Ruthman Gusher Coolant Pump.

Gusher Coolant Pumps are designed to give you years of dependable service.

They are simple in design, have pre-lubricated heavy duty ball bearings, no metal-to-metal contacts within the pump housings, and are electronically balanced to assure you of low maintenance cost and long life. Write us today, there's a Gusher to fit your requirements.

THE RUTHMAN MACHINERY CO.

1816 READING ROAD

CINCINNATI, OHIO

9. Bulletin No. 850—put out by the United States Diamond Wheel Co., Dept. BB, Aurora, Ill.—gives technical data, comparative hardness grades, selection information and dimensions of its extensive line of diamond wheels and carbide tool cutter. How to use the various bond types for specific grinding applications is explained.

10. The qualities of Meehanite as a die material are reviewed in the pocket-size Bulletin No. 41, entitled "Meehanite

Metal as a Material for Forming and Stamping Dies." A tabular summary of its physical properties is included in the bulletin, issued by Meehanite Metal Corp., 714 North Ave., Dept. BB, New Rochelle, N.Y.

11. The Marvic Universal tool post and tool holders are described in a 4 page folder which also points out advantages and illustrates typical installations. Write Marvic, Inc., 350 Peninsular Ave., Dept. BB, San Mateo, Calif.

DRILL HEADS

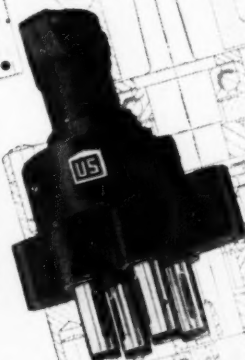
Expertly Designed

to Fit YOUR Needs For...

DRILLING • TAPPING •
SPOTFACING • REAMING •
BORING



Fixed Center Oil Circulating Spindle Head with Vertical Adjustment Spindles. Designed mainly for high speeds.



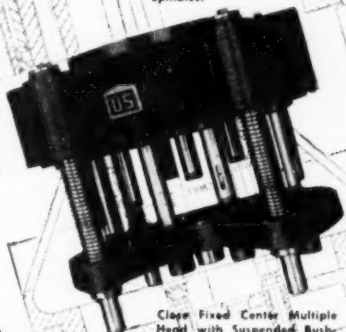
Standard Fixed Center Construction, Bushed Guide Rod Holes, and Lifter Rod Holes with Vertical Adjustment Spindles.

We manufacture, at lowest possible price, all types of multiple spindle fixed center adjustable and lead screw tapping heads.



SINCE 1915

UNITED STATES DRILL HEAD CO. • CINCINNATI 4, OHIO



Close Fixed Center Multiple Head with Suspended Bushing Plate.

12. In the fifth edition of its transformer lamination catalog, No. EM3, Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Dept. BB, Pittsburgh 22, Pa., presents technical information and full size drawings of all the available standard shapes. Count and weight of laminations, magnetic and mechanical dimensions, tolerances and general test data are also included in the catalog contents.

13. General recommendations for the heat treatment of tool steels, hardness

conversion table, wire gage comparisons, decimal equivalent charts and much other basic information on cold finished fine steels are contained in the compact Catalog No. 6 prepared by the Pittsburgh Tool Steel Wire Co., Dept. BB, Monaca, Pa.

14. The Bellows air motor and hydro-check features of the No. 3 AF Crownshield production milling machine are said to permit rapid traverse of the work to the tool, controlled feeding through the cut, and rapid return of



BARNES

ROCKET

POWER and HAND HACK SAWS
ARE IN DEMAND
FOR PRODUCTION CUTTING



1. HIGH SPEED STEEL
2. FLEXIBLE—TOUGH
3. SAFE—SHATTER-PROOF
4. MEETS EVERY SHOP TEST
5. FOR ALL-PURPOSE CUTTING

W. O. BARNES CO., INC.

1287 TERMINAL AVE., DETROIT 12, MICH.

the work to its starting point, adding to its productivity. Detailed specifications and work range suggestions are included in the folder prepared by Crowningshield-Harris Co., Dept. BB, Greenfield, Mass.

15. How Dumore precision tools supply the answer to most machine shop grinding needs is told in the 40 page catalog recently issued by The Dumore Co., 1335 Seventeenth St., Racine, Wis. The illustrated catalog gives specification

data, operating and design information and outstanding features of its equipment—tool post grinders, hand grinders, flexible shaft tools, automatic drill heads, light drilling equipment and drill grinders.

16. The use of Ex-Cell-O's style 84 precision surface form grinder in the jet engine program is described in illustrated Bulletin 50226. This machine is designed for grinding flat, grooved or curved surfaces on the roots of jet en-

THE *Workhorse* OF SMALL GRINDERS



Aro Short Grinder Model 7149, 17,000 R.P.M.



ARO does it faster... at lower cost!

That's why Rohr Aircraft at San Diego —and hundreds of other progressive plants today — prefer ARO. Complete line grinders for jet engines... also heavy duty vertical and horizontal grinders of all types. Write for new catalog 60.

The Aro Equipment Corp., Bryan, Ohio.

Aro Equipment of Canada, Ltd., Toronto, Ont.

ARO AIR TOOLS

Also... LUBRICATING EQUIPMENT... HYDRAULIC EQUIPMENT... AIRCRAFT PRODUCTS... GREASE FITTINGS

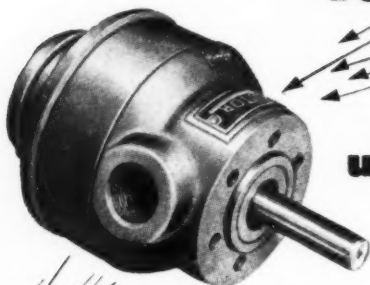
gine compressor blades and turbine buckets in an automatic cycle, according to the manufacturer, the Ex-Cell-O Corp., 1200 Oakman Blvd., Dept. BB, Detroit 32, Mich.

17. Amlintool, Inc., of 20 Beckley Ave., Dept. BB, Stamford, Conn., is the exclusive importer for Artillerie Inrichtingen machine tools, designed and manufactured by The Netherlands Arsenal at Hembrug, Holland. Specifications and special features of the fol-

lowing AI models are detailed in a 4 page folder by Amlintool: Model U.1 universal toolroom and cutter grinder; Model DR.1.L precision toolmaker's lathe; and Model DR.O second operation machine and hand operated turret lathes.

18. Wohlhaupter universal facing and boring heads with self acting power feeds and automatic end release are illustrated with accompanying specifications in Bulletin 198E. The firm's

the "label"
tells
you
it's
unique



See the Gerotor name-plate on a hydraulic pump and you know what's inside . . . the renowned Gerotor mechanism. It minimizes friction, wear and slippage . . . assures higher efficiency at lower operating cost. Eleven sizes, some for pressures up to 1200 p.s.i. continuous, 1500 p.s.i. intermittent. Specify Gerotor!

Gerotor May Corp., Box 86, Baltimore 3, Md.

GEROTOR

HYDRAULIC PUMPS

American agent is Karl A. Neise, 381 Fourth Ave., Dept. BB, New York 16.

19. Features embodied in the No. 16 Van Norman ram-type milling machine are said to provide definite contributions to faster, more economical milling. The adjustable cutterhead and movable ram permit conventional, horizontal and vertical, as well as angular, milling on one machine. These and other features are further outlined in

an attractive folder by the Van Norman Co., Dept. BB, Springfield 7, Mass.

20. In a 2 page circular, the E. Horton & Son Co., Dept. BB, Windsor Locks, Conn., stresses the accuracy and gripping power of Horton chucks. Views and diagrams show scroll universal chucks, independent chucks, face plate and boring mill jaws, scroll combination and 2-jaw chucks, lathe spindle mountings, etc.

**DO
LAPPING
AND A ZILLION
OTHER JOBS ON**

**SCHAUER
SPEED
LATHES**



Schauer Speed Lathes handle many secondary finishing operations—lapping, filing, deburring, polishing, etc.—on metal and plastic parts, *faster, at less cost*. Thousands are in use on an almost *unlimited* variety of jobs.

Many sizes and models with holding devices to fit the application. Speed *your* production with Schauer Speed Lathes. Write today for Bulletin 500.

SCHAUER MANUFACTURING CORP.

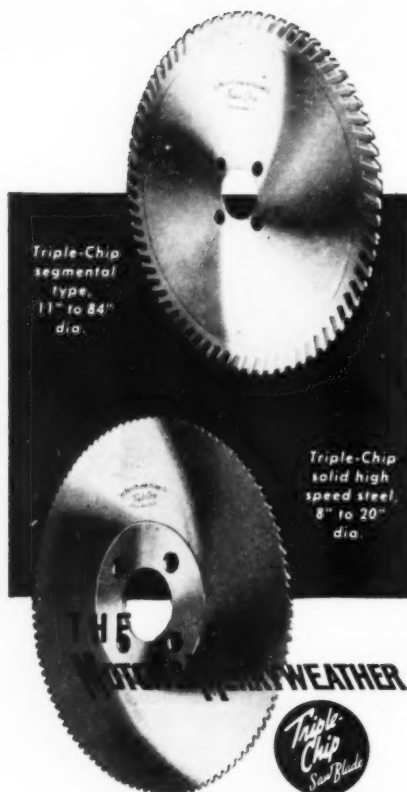
4502 Alpine Ave., Cincinnati 36, Ohio

21. Case histories of the relatively new metal "Formbrite" are reported in Publication B-39 to show how applications of this Anaconda product are contributing to the fabrication of finished products. It is produced in the form of sheet and strip for pressroom work; also in wire for cold heading operations. Write The American Brass Co., Dept. BB, Waterbury 20, Conn.

22. Handle knurling, designed to give a firm grip, yet not cut deep enough

to cause blisters on the hands of users, is claimed as a distinctive feature of the Crescent line of tenite handled screwdrivers. Circulars issued by the Crescent Tool Co., Dept. BB, Jamestown, N.Y., also mention such features as hot forged blades, hardened full length, with blade and handle assembled under pressure.

23. Two handy welding manuals—prepared by Welding Equipment & Supply Co., 223 Leib St., Dept. BB, Detroit 7,



**GIVES YOU EXCLUSIVE
ADVANTAGES IN CUTTING OFF
STOCK FAST AND ACCURATELY**

Fast, burrless cut-off of shapes and tubes up to 30" round. Let M & M Triple-Chip saw blades give you the higher production-with-accuracy which Industry must attain and maintain. Ask your dealer.

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THE MOTT & MERRYWEATHER MACHINERY CO.

715 PENTON BUILDING
CLEVELAND 13, OHIO



**REMEMBER — IT'S THE COST
PER CUT THAT COUNTS!**

Only
M & M builds
ALL 3:
CIRCULAR SAW
SAW BLADE
BLADE GRINDER

Mich.—illustrate various applications of the metallic arc, atomic hydrogen and atomic arc phases of welding. Manual "A" treats of specialized welding in the forging field, and Manual "B" covers the entire tool and die welding field.

24. Originators of shaft-mounted speed reducers, The American Pulley Co., Dept. BB, 4200 Wissahickon Ave., Philadelphia 29, Pa., is introducing advanced design features of the "Shaft King" in a 20 page bulletin. The catalog gives information on use and installation, with instructions on selection of correct size for given applications. Cutaway and phantom drawings show construction details.

25. Automatic Methods, Inc., 42 Walnut St., Bldg. 163, Newark 2, N.J., maker of precision parts for the aircraft industry, has three bulletins on its "Autotap" lead-screw tapping attachment, which is said to convert a standard drill press into a precision tapping machine. Bulletin 101 lists operating data; Bulletin 102 gives price information; and Bulletin 103 includes instructions for setting up the attachment.

26. Reasons for quenching oil failure are discussed in the bulletin on "Delpark industrial filters and quenching oil applications" offered by Industrial Filtration Co., Dept. No. 00526, Lebanon, Ind. Typical installations are given, together with performance reports on these installations.

27. Desmond-Simplex steel slide vises in a complete selection of types and sizes suitable for industrial requirements, schools and home workshops are shown in Catalog No. 60 by The Desmond-Stephan Mfg. Co., Dept. BB, Urbana, Ohio. Steel slides milled from solid steel are claimed as exclusive features of Desmond-Simplex heavy duty models, thus assuring extra strength and greater capacities.

28. A comprehensive catalog—Bulletin No. 752—is available from DeWitt Equipment Co., 136 Lafayette St., Dept.

GET EXCLUSIVE ADVANTAGES

in the Cutting Off of
Small Stock and Shapes
with the No. 00

**MOTCH &
MERRYWEATHER**

**CIRCULAR SAWING
MACHINE, Employing**

the

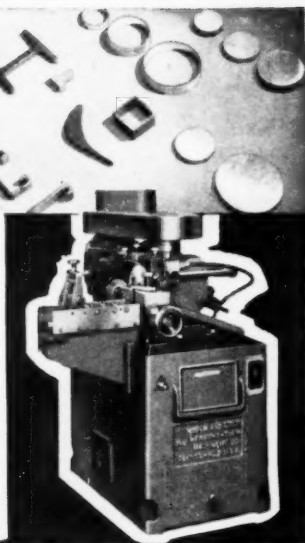
**Triple-
Chip
METHOD**

For any ferrous or non-ferrous metal, titanium to magnesium. Square, burrless ends accurate to length with the Triple-Chip method. Available in automatic or manual stock feed. Capacity—up to 3" dia. tubes or shapes. Get full details.

THE MOTCH & MERRYWEATHER MACHINERY CO.

715 PENTON BUILDING • CLEVELAND 13, OHIO

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT •



Shown—No. 00-A, automatic.

**Investigate,
too, This Aid to
Production**



**Make the Most
of These Distinct
Advantages**

For the most favorable results, time- and profit-wise, use Motch & Merryweather's superb coolant. Anti-weld, averting pick-up. Sharper tools and longer-lived. Oily, but not "greasy". Smokeless, odorless. A real aid to money-making production.

BB, New York 13, N.Y. Fully illustrated, it lists a wide range of new machine tools, as well as many precision tools and measuring equipment of both American and European manufacturers.

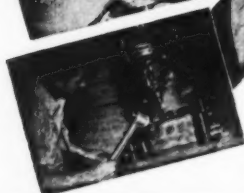
29. Helpful data Bulletin No. 8 deals with La-Led free machining, lead bearing steel bars manufactured by the La Salle Steel Co., Dept. BB, Chicago 80, Ill. Case studies of industrial applications are given, together with data on

composition and mechanical properties, bending and crimping qualities, surface quality, etc.

30. Bending rolls by Niagara—6" series all-steel—what they do and how they work, are covered in Bulletin 88A of the Niagara Machine & Tool Works, 637-697 Northland Ave., Dept. BB, Buffalo, N.Y. Design of the machine is shown and operation sequence is summarized.

NUPLA HAMMERS
mighty yet gentle

**Outlast and Outperform
All Other Soft-faced
Hammers Many Times Over**



NUPLAFLEX
REPLACEABLE
TIPS

CAN'T
WORK LOOSE



Safety tools, spark-proof . . .
Maximum impact, minimum effort . . .
Will not gash, mushroom or chip . . .
Will not damage work. No rebound . . .
Not affected by oil, gasoline, or common
industrial acids.

"13 Weights, 5 Sizes, 4 Tip Hardnesses — A Tool For Every Job"

Order From Your Industrial Dealer or Write

NEW PLASTIC CORPORATION

1041 NO. ORANGE DRIVE

LOS ANGELES 38, CALIFORNIA

SEND FOR YOUR

**FREE
COPY**

**NEW
ACME
BUSHING
CATALOG**

Contains America's

**LARGEST
BUSHING
SELECTION**

Features 2 Standards
A.S.A. Plus Acme

**Makes Bushing
Procurement
Easy... Fast!**



Simplifies, speeds bushing selection.
Packed with valuable data. Saves you
time and trouble. Also includes liners,
leader pins, dowel pins, locating jigs,
etc.

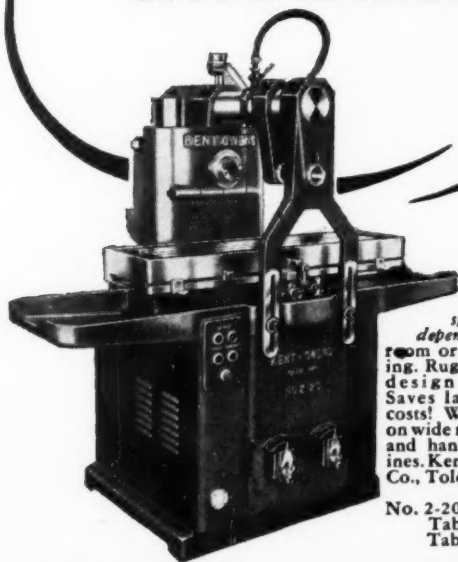
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**ACME
INDUSTRIAL COMPANY**

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MANUFACTURERS OF STANDARDIZED DRILL JIG AND FIXTURE BUSHINGS

**MILL IT *faster...*
SAVE LABOR!**



Kent-Owens advanced features mean speed, accuracy and dependability... in tool room or production milling. Rugged... simple in design and operation. Saves labor... reduces costs! Write for bulletins on wide range of hydraulic and hand-operated machines. Kent-Owens Machine Co., Toledo, Ohio.

No. 2-20 Milling Machine
Table, 42" x 12"
Table travel, 20"

KENT-OWENS *Milling Machines*

31. Proper placement of the electric motor to insure correct cooling is considered in Bulletin No. 1142, published by Onsrud Machine Works, Motor Division, 3908 Palmer St., Dept. BB, Chicago 47, Ill. The data covers high speed induction motors from 1/4 h.p. to 100 h.p., with spindle speeds ranging from 3600 r.p.m. to 21,000 r.p.m. Complete dimensional specifications are given for all types of motors.

32. Suitability of the Air - Hydraulic

press for kick and arbor press operations is covered in the 8 page bulletin of Air-Hydraulics, Inc., 811 Belden St., Dept. BB, Jackson, Mich. Air index table with built in speed control, "exploded air" impact hammer and other equipment, together with accompanying dimension sheets, are illustrated in the folder.

33. When "standard" won't do, Bulletin 53-PD—put out by Electric Specialty

78 Holes tapped in one piece -

*Another Cleveland
Design to
Speed Production!*

This Model E-2 with special column and special hand index table was designed by Cleveland to cut costs on a large jet engine part. 63 holes .250-28 and .375-24 are tapped on one side and 12 holes .375-24 and 3 holes .750-16 on the reverse side. 5 different bolt circles are used.

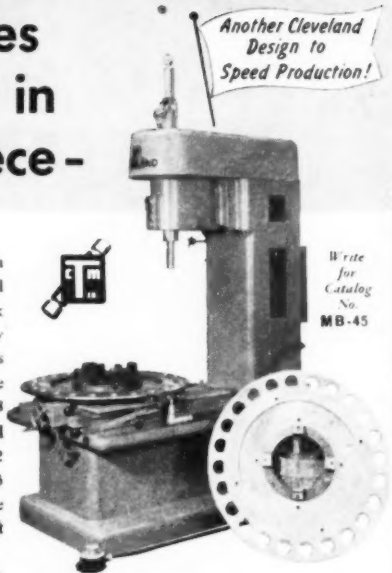
Cleveland engineers have designed scores of special machines to cut production costs. It will definitely pay you to put your production problems up to them.

THE CLEVELAND TAPPING MACHINE CO.

A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC.

CANTON 6, OHIO

Write
for
Catalog
No.
MB-45



For Better Tapping - - Faster!

CLEVELAND

tapping machines

lead

screw



Co., Dept. BB, 211 South St., Stamford, Conn.—suggests turning to Esco for specially designed motors or generators to satisfy exact requirements. Basic types of Esco motors and power sources are outlined, as well as factors to be considered in the selection of motors.

34. Screw-thread problems—important in the manufacture, inspection and use of threaded products—are explained in Form EG52 by the Johnson Gage Co., Dept. BB, Bloomfield, Conn. Johnson

thread comparator accessories for standard and special applications are said to accomplish checking for concentricity and squareness.

35. How production savings may be realized by taking advantage of the Pangborn Blastmaster Rotoblast to batch blast castings, forgings and heat-treated parts is recommended in Bulletin No. 223 obtainable from the Pangborn Corp., Dept. BB, Hagerstown, Md.



*★ Star Performer
In The Reamer Field*

Staples

**CARBIDE-TIPPED
SHELL TYPE EXPANSION REAMER***

For maximum tool life with minimum tool servicing, put this Staples Shell Type Expansion Reamer on the job. Tool is returned to original diameter simply by driving the shell up the tapered arbor. Tool can be expanded many times without a re-grind. To obtain a new tool, just order a new shell—a standard stock item.

Standardize on Staples Carbide-Tipped Circular Cutting Tools. You'll get longer tool life—greater accuracy—finer hole finish—and spend less time on tool servicing. Staples is the **quality** name in carbide tool production. You'll save money in the **long** run with Staples.

*Patented.

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio

Distributors in Major Cities

Staples

CARBIDE-TIPPED CUTTING TOOLS

*A complete line of Circular Carbide-Tipped Cutting Tools
Expansion Reamers — Special Tools*

36. Tumb-L-Matic, Inc., Dept. BB, 4510 Bullard Ave., New York 70, N.Y., has issued Bulletin MU-52 on its line of multiple-unit tumbling barrels for deburring, cutting and finishing of wood, plastic and metal parts.

37. The I.D. hole quencher case hardens holes 7 times faster, according to a 4 page bulletin offered by The Palmer Mfg. Co., Dept. BB, 3790 Ridge Road, Cleveland 9, Ohio. This unit is adjust-

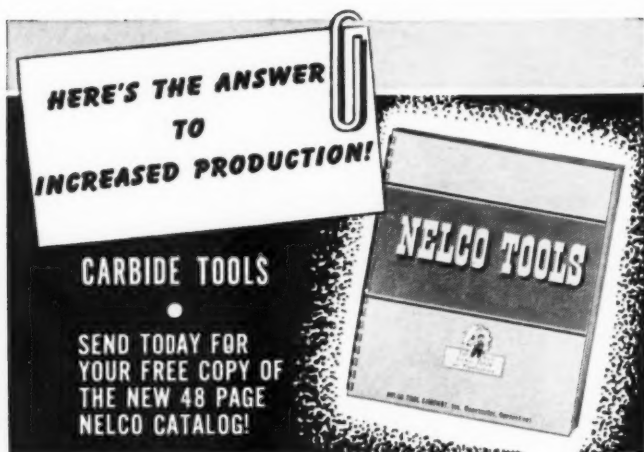
able to handle from 1/16" to 3" i.d. holes in blanks 1/4" to 8" o.d. and from 1/16" to 6" long.

38. Pioneers in putting precision to work as a practical, productive tool, the Pratt & Whitney Div. of Niles-Bement-Pond Co., Dept. BB, West Hartford 1, Conn., presents Bulletin No. 553, covering its line of continuous gages and control units. Most of the instruments described in the folder are versatile and adaptable to a wide variety of applications.

**HERE'S THE ANSWER
TO
INCREASED PRODUCTION!**

CARBIDE TOOLS

**SEND TODAY FOR
YOUR FREE COPY OF
THE NEW 48 PAGE
NELCO CATALOG!**



Get the graphic story . . . Nelco carbide tools assure faster, better, more profitable production.

Nelco Tool versatility—actually your assurance of *special tools* at *standard prices*—is shown in the nearly 800 carbide cutters Nelco regularly maintains in stock. In the Nelco line of 4 flute end mills alone, there are available 63 standard cutters in diameters from $\frac{3}{8}$ " to 2".

Diamond-hard carbide swiftly chews through the toughest metals—works to closer tolerances and leaves finer finishes than conventional cutters. Higher table feeds mean **MORE** production. Costly down time is slashed! Nelco tools stay sharper longer—mill more pieces per grind. Nickel shim brazed carbide tips on alloy steel bodies mean year after year of service free operation.

Nelco **SERVICE** extends directly into your plant! An experienced Nelco field engineer will be glad to discuss, suggest, troubleshoot *in your plant, on your machines.*

Unusual, out of the ordinary tools described in this catalog can be designed or built to your specifications by Nelco carbide technicians.

NELCO TOOLS

**For that Extra
EDGE in Production**

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

39. Pantographic engraving on plastics or metals is done on various models of Preis-Panto engraving machines described in a folder published by H. P. Preis Engraving Machine Co., 647 State Highway 29, Dept. BB, Hillside, N.J. The models include a 2 dimensional machine for general engraving, a heavy duty bench type utility engraver, a 3 purpose model, motorless engraver and accessories.

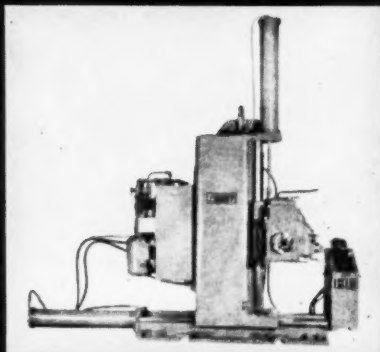
40. Over 4000 standard extruded aluminum shapes, rod, bar and tubing are included in the 98 page wire bound catalog available from Precision Extrusions, Dept. BB, Bensenville, Ill. Valuable to designers and engineers is the compilation in chart form of physical properties and recommended applications for the 14 most generally used alloys. Isometric drawings accompany

SOLVE TOUGH PROFILE MILLING
AND BORING PROBLEMS SENSIBLY

Consult **FORNEY**

1st

Irregular profile milling and boring of aluminum and magnesium castings are routine with Forney duplicator equipped "package" boring and facing machines. Spindle housing as a motor power unit moves directly into work face, gives more power and rigidity to cutting tool. Write today. Forney engineers are ready to serve you on receipt of your drawings.



Unretouched Photograph

FORNEY'S, INC.

Manufacturers of Special Machinery Since 1916
201 Elm Street—New Castle, Penna.

the numerical data to aid visualization of intricate shapes catalogued.

41. Cleaning of metal surfaces and assemblies, preparation for painting and stripping organic finishes are problems discussed in its catalog on industrial metal cleaning chemicals and processes by the Whitfield Chemical Co., 14225 Schaefer Highway, Dept. BB, Detroit 27, Mich.

42. "Air for power, Ross for control," is the manufacturer's introduction to Bulletin No. 101A, which explains the three fundamental types of control valves manufactured by Ross Operating Valve Co., 120 E. Golden Gate Ave.,

Dept. BB, Detroit 3, Mich. The integral pilot operated type is known as Ross Introl; the remote controlled as Ross Retrol; the third type is direct operated. Advantages of each type, how they work and a list of available standard models are included in the booklet.

43. The Threadwell tap manual contains suggestions on tap sharpening; facts about flutes; unified and American screw thread system; standard system of marking; table of constants; tapping speeds and lubricants; common tap problems; and much other useful information in this handy, pocket size book offered by the Threadwell Tap & Die Co., Dept. BB, Greenfield, Mass.

Practically a complete grinding department in itself!



HAHN and KOLB WSRO UNIVERSAL TOOL and CUTTER GRINDER

Here's the most useful machine your grinding department can have . . . It does all the required work—and does it with precision, accuracy, speed and safety! With extra equipment it can be used as a tool grinder, a cutter grinder, cylindrical, internal and surface grinder . . . as well as for grinding twist drills, radial grinding and relief work at any angle setting within 360°.

Built in Germany to American specifications and measurements, the WSRO is sturdily constructed to give complete satisfaction wherever it is used. Tooling interchangeable with American machine tools.



PARTIAL LIST OF SPECIFICATIONS

| | |
|-----------------------------|--------------|
| Long. movement of the table | 16" |
| Cross movement of the table | 10" |
| Cylindrical grinding length | 84.5" |
| Maximum swing over table | 10" |
| Maximum grinding wheel | 7" |
| Spindle speeds | 3000 to 6000 |
| Motor | 1 HP |

PROMPT DELIVERY • NO PRIORITIES REQUIRED

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...for machine tools!

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Manufacturers • Merchants • Distributors

410 BROOME STREET • NEW YORK 13, N. Y.
CANAL 6-7400 • CABLE ADDRESS WOODWORK, N. Y.

44. Comparisons of Sier-Bath flexible gear couplings with the conventional flange and bolt types are given in Catalog C-4, published by the Sier-Bath Gear and Pump Co., Inc., 9252 Hudson Blvd., Dept. BB, North Bergen, N.J. Claimed advantages are enumerated; typical applications and engineering data are also included.

45. Features of the Baby Big solenoid

pilot Valvair are summarized in Bulletin "PB" by the Valvair Corp., Dept. BB, Akron 11, Ohio. Cross section drawings, specifications and other data are given of this air control valve designed for handling air, vacuum, oil, water and inert gases. The valve may be operated up to 400 cycles per minute.

46. Sunoco technical Bulletin No. 12 describes Sunicut 11-S and 209-S dual purpose oils for medium and heavy

CHECK WITHIN .0001" WITHOUT EXPERIENCE



SHAFT DIAMETER



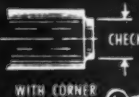
USING RADIUS GUIDES



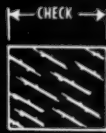
HOUR GLASS GAGING



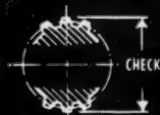
SHARP CORNER



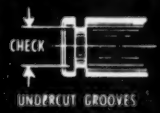
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STANDARD DIMENSIONS



OUTSIDE DIAMETER
EVEN OR ODD No. OF TEETH



UNDERCUT GROOVES



DEEP THROATS

1. Use at machine without previous experience.
2. Has operator appeal; they will want to use it.
3. Instantaneous high point reading; no rocking required.
4. Shockproof; no lost accuracy; there is no gage like it.
5. Available in numerous modifications for almost any type of check.

Ask for Catalog D.S.

NILSSON GAGE CO., INC.

Poughkeepsie New York

duty operations on automatic screw machines; Bulletin No. 13 describes Suncut 102-S and 110-S, claimed to be effective for heavy duty screw machine work and operations such as broaching, gear hobbing, threading and tapping. Copies may be obtained from the Sun Oil Co., Dept. BB, Philadelphia 3, Pa.

47. Verson hydraulic presses in service are shown in Catalog H-52 by the Verson Allsteel Press Co., 9303 S. Kenwood

Ave., Dept. BB, Chicago 19, Ill. Design details are given of the hydrol speed circuit and other features of its line of presses—straight side, post type, double action, gap frame and a wide range of special types.

48. Actual operation of the Waldes Truar internal grooving tool is described in a bulletin offered by Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N.Y. Diagrams, special adaptation charts and engineering data

SHUSTER

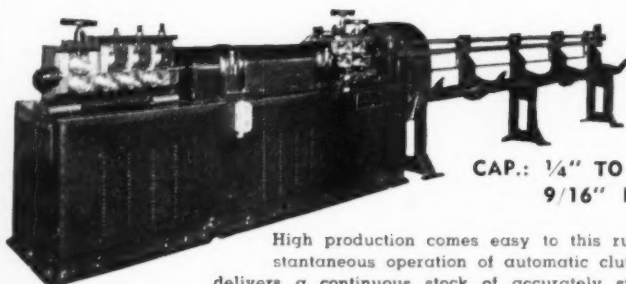
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Automatic

WIRE STRAIGHTENING
AND CUTTING MACHINES



Straighten and Cut Wire at HIGH SPEED



THE REDESIGNED
FULLY AUTOMATIC
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Type 3A

CAP.: $\frac{1}{4}$ " TO $\frac{1}{2}$ " DIAMETER,
9/16" IN BASIC WIRE.

High production comes easy to this rugged SHUSTER. Instantaneous operation of automatic clutch and cut-off cam delivers a continuous stock of accurately straightened, cleanly cut wire. Write for details on this and other versatile SHUSTERS.

METTLER MACHINE TOOL, INC.

Representatives in all principal cities and foreign countries.

19 Congress St.
New Haven, Conn.



STEEL PRESS BRAKES

43 Standard Sizes

Readily adapted for a wide variety of bending, forming, drawing, notching, blanking, punching, embossing, etc.

DIES Complete Line of Induction Hardened Dies for All Makes and Sizes of PRESS BRAKES.

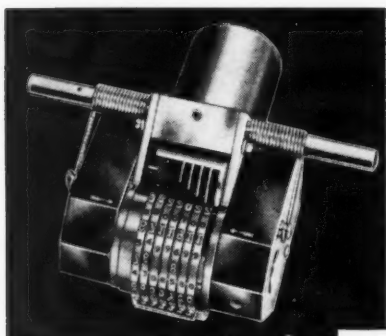


DREIS & KRUMP

MANUFACTURING COMPANY

7440 S. Loomis Boulevard, Chicago 36, Illinois

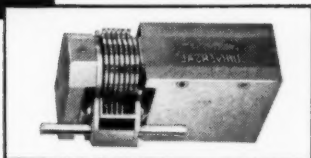
CHICAGO
STEEL BENDING BRAKES
BOX AND PAN BRAKES
PRESS BRAKES



Numbers...
FROM 1 TO
999999999

**ON STEEL, BRASS,
COPPER, ALLOYS,
PLASTIC & WOOD**

AND THAT'S NOT ALL—



"Trade Mark" Numbering Head

these new Parker numbering heads for punch press stamping come in four to ten digit models and stamp consecutive or repeat numbers cleanly and sharply into the most rugged stock. A simple duplicating attachment can be added if required and a compound numbering head can be manufactured to your specifications to embody a trade mark, name or group of symbols to be stamped in one operation.

The larger heads have a direct reading feature which enables determination of machine setting at a glance from engraved numbers on the front of lettering wheels. Here is another instance of Product Flexibility. Let Parker's expert craftsmen and eighty years of experience solve your marking die and stamping problems too!

SEND FOR PARKER'S NEW CATALOG NOW! ➡

Be sure to have this fact-filled brochure describing hundreds of Parker stamps and marking dies in your file.



THE
PARKER
STAMP WORKS, INC.
MARKING DIE & MACHINERY DIV.
FRANKLIN AVENUE • HARTFORD, CONNECTICUT

help to emphasize advantages of the tool.

49. How the Wales hydra spring uses compressible fluids to produce spring pressures up to 3800 lbs. is told by the Wales-Strippit Corp., 396 Payne Ave., Dept. BB, North Tonawanda, N.Y., in its hydra spring bulletin. A feature of the

folder is the comparison of the small, compact Wales hydra spring with a big, heavy duty railroad car spring. The high pressures produced in such a small area make the Wales product ideal for stripping actions in all types of dies.

50. More cuts per hour are claimed for the McDonough model No. S-2 single

CAPEWELL

POWER

HACK SAW

BLADES

FOR LONGER SAW LIFE !

HOW TO USE POWER HACK SAWS

CAPEWELL

Write for bulletin

THE CAPEWELL MANUFACTURING CO.
82 GOVERNOR ST., HARTFORD 2, CONN.

spur carriage dog and the model No. ND-2 nondefacing carriage dog. Both types will hold logs up to 48" in diameter, and the model ND-2 takes cants and boards from 3½" to 20". A catalog sheet illustrating and describing both models is available from the McDonough Mfg. Co., 1520 Galloway, Dept. BB, Eau Claire, Wis.

51. "If the Chips Fly Your Way," the Dilley will provide needed protection,

according to a folder by the manufacturer, The Dilley Mfg. Co., 1656 Ansel Road, Dept. BB, Cleveland 6, Ohio. This modern guard for machinery magnetically grips on the iron surface of any machine in any position convenient to the operator.

52. To give production men and engineers a working knowledge on the subject, Crane Packing Co., 1812 Cuyler Ave., Dept. BB-3, Chicago 13, Ill., has

Engineers! ELIMINATE ASSEMBLY PROBLEMS WITH



DIES

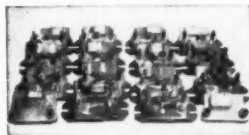


HERE'S THE WHOLE STORY -

Send TODAY for "The Story of B. Jahn Production Proved Dies" — a fact-packed brochure illustrating B. Jahn's facilities and their production-increasing, money saving applications.



Modern production requires assemblies — each component demanding a separate tool and die — each having a vital relationship — all needed when you want them. In the modern B. Jahn plant, 165 skilled tool-makers representing 3654 years of experience work together developing multiple dies of flawless precision for intricate assemblies.



Part of a set of twenty-eight B. Jahn built precision forming dies, to produce different component levers for one of America's largest calculating machine manufacturers. B. Jahn builds multiple dies as a team — each engineered to do a specific job perfectly.

*Investigate B. Jahn
and Invest in
Production Economy*

B. Jahn

THE B. JAHN MANUFACTURING COMPANY, NEW BRITAIN, CONNECTICUT

prepared a step by step explanation on how to translate light band readings into terms of surface flatness. Entitled "Measuring Flatness with Lapmaster Monochromatic Light and Optical Flats," this piece of literature is so arranged that it can be spread out to serve as a handy wall chart.

53. The Dickerman height gauge, made in column lengths of 10", 14" and 18",

is one of the special tool developments of the H. E. Dickerman Mfg. Co., 321 Albany St., Dept. BB, Springfield, Mass. Its adaptability for comparator or scriber use is illustrated in a folder offered by the firm. The differential screw adjustment design allows for practically no lost motion, and settings in the tenths of thousands are attained.

54. Wells Mfg. Corp., 707 Coolidge Ave.,

Three Rivers, Mich., announces Catalog No. C-52 showing the Wells metal cutting band saws—both heavy duty and production and utility models. Pertinent information, operating data and applications of the Wells-O-Bar feed master and other special machines are also given.

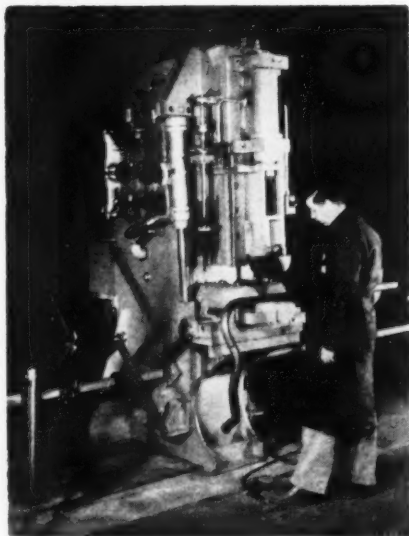
55. Hobart arc welding and the hundreds

of ways it pays are pointed out by a generous use of photos in the 40 page manual offered by Hobart Brothers Co., Dept. BB, Box EW-173, Troy, Ohio. Its application is shown in 18 different industries for production, maintenance and repair. The last section of the book is devoted to a description of the arc welders, electrodes and accessories.

Pines Announces 20 ton Bending Press

A vertical ram type tube and pipe bending press, designed with unusual working clearance to speed handling a variety of multiple bends in different planes, is announced by Pines Eng. Co., Inc., 698 Walnut St., Aurora, Ill. The press is a fully hydraulic, self-contained unit with a rated capacity of 20 tons. Outstanding design features include twin equalizing cushion cylinders offset on the press frame, automatic angle-of-bend cycling with automatic return to starting position, variable speeds, oil coolers, single screw adjustment for wing dies, movable foot control and shortened die holders for maximum clearance.

The unit has adequate power and capacity for repeat bending of ½" through 2" o.d. steel tubing size with a maximum wall thickness of .083" without excessive flattening, wrinkling, or distortion. Clearance is provided to bend a 2" tube with a 5" centerline radius to 180°. One of the primary applications of the new press is bending automotive exhaust and tail pipes, and the overall design of the press reflects



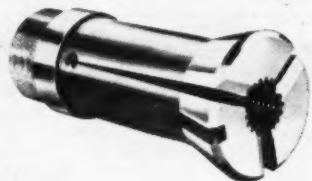
the extensive research conducted in this field to meet specific requirements of automotive manufacturers.

Collet is self cleaning

A self cleaning collet on which patents are pending has been introduced by Sheffer Collet Co., Dept. BB, Traverse City, Mich.

The collet is designed for use on automatics, turret lathes and other machines where the collet is used in a rotating spindle.

Sheffer's new self cleaning feature consists of an inclined plane on the following edge of each slot face. Instead of an edge which collects foreign



matter, the angular surfaces act as fan blades which forcibly repel it.

if you do ANY of these jobs...

*you need this
jack-of
-All-jobs...*

No. 7 Combination Shear,
Punch and Coper

the **Kling COMBINATION SHEAR-PUNCH-COPER**

Remember, when you were a boy, what a hit that 6- or 7-blade jack-knife made? You could do just about everything with it!

This Kling Combination Shear, Punch and Coper will make an equally big hit in your shop. It does any of the jobs shown above, and a lot more. It can turn out the same work as a separate punch, angle shear, bar shear, plate shear and notch. Best of all, it costs only a few dollars more than a single-purpose punch.

To gain maximum speed and safety, each end operates

independently. Foot pedals allow operators to keep hands free to hold work.

In shops of every size, the Kling Combination is speeding production, reducing man-hours, and increasing profits on metal-working jobs. Investigate what it can do for you. Available in 3 sizes, for light, medium and heavy work. Ruggedly built, and meets machine tool precision standards.



Write for latest FREE Bulletin No. 347. Gives complete details of jobs this Machine can handle; also capacities, other technical data and specifications.

KLING BROS. ENGINEERING WORKS
1323 North Kostner Avenue, Chicago, Illinois

Since
1892
Kling

...an investment in speed!



Friction Saw



Double Angle Shears



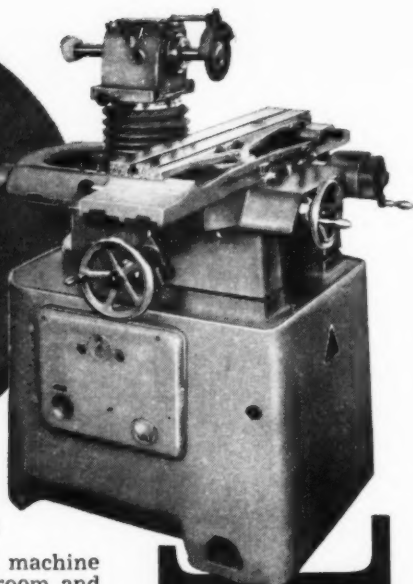
Rotary Shears



Punches



Plate Bending Rolls



UNIVERSAL TOOL ROOM GRINDER

Model U1—A sturdy, precision built machine for every grinding need in the tool room and laboratory. Ideal for cutters, mills, reamers; particularly suited for cylindrical, surface and internal grinding.

Table Size— $35\frac{1}{2}'' \times 5\frac{1}{8}''$

Table Travel— $16\frac{1}{8}''$

Cross Travel— $8\frac{1}{2}''$

Between Centers— $27\frac{1}{2}''$

Swing on Centers— $11''$

Wheel Speeds—3000/6000 r.p.m.

The **Model U2** performs the same duties but in addition, grinds contour cutters from a template.

ATTACHMENTS for Heavy Duty Cylindrical, Internal, Radius, Long Reamers and Universal Hob Grinding.

ALL machines are equipped with graduations and electrical controls to fit American requirements. Service and Replacement parts for all machines.



PROMPT DELIVERY

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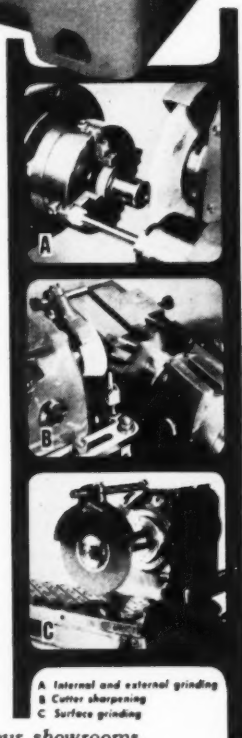
EXCLUSIVE IMPORTERS for U.S.A. and CANADA



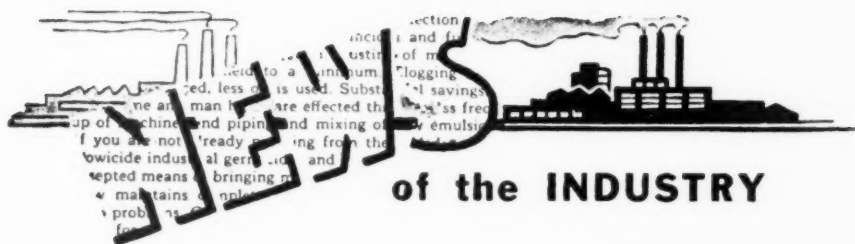
AMLINTOOL, INC.

18 Beckley Avenue, Stamford, Conn.

Write for Catalog, Prices and Demonstration at our showrooms.



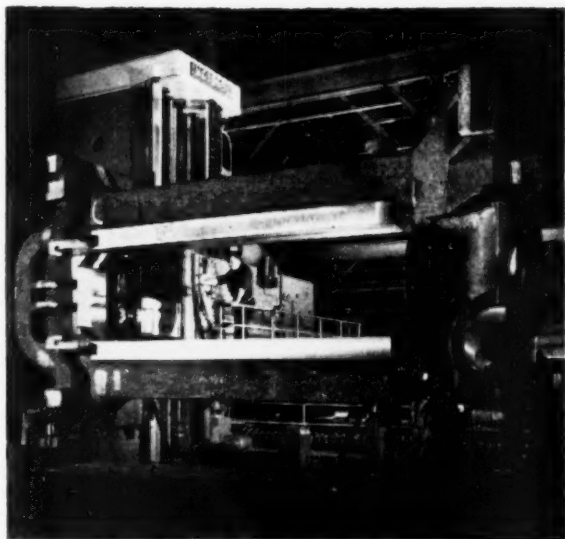
A Internal and external grinding
B Cutter sharpening
C Surface grinding



Lewis Foundry in Modernization Program

Now nearing completion at the plant of Lewis Foundry & Machine Division of Blaw-Knox Co., Pittsburgh, Pa., is a modernization program that enables Lewis for the first time to compete for some of the largest types of rolling mills and related equipment. This is made possible by the installation of many new machine tools of larger capacity, as well as by additions to the manufacturing space, crane capacity, and related facilities. The program also expands the volume capacity of this plant by 50 to 60%.

Typical of the addition of modern machine tools of larger capacity, is the recent installation of a 409,000 pound milling and boring machine. This new machine cost more than \$400,000 installed and is the largest unit of its type ever built by Ingersoll Milling Machine Co., Rockford, Ill. The cutter is carried by a 24-inch ram and will extend into pockets as deep as 74 inches. The head has a vertical travel of 12 feet and a horizontal travel of 46 feet. The spindle is driven by a 75 h.p. motor and the



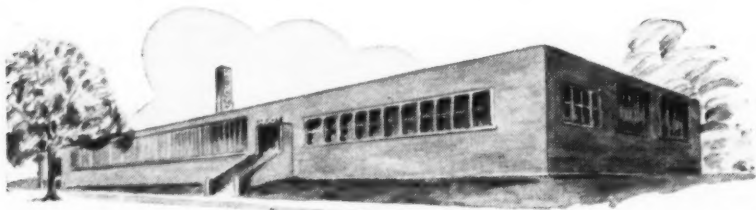
total motor power used to operate the machine is 195 h.p.

Lewis will use this new unit to machine mill housings and other large rolling mill equipment. Shown in the accompanying photograph is a view of the unit milling an 81 ton casting which is the housing for a 23" and 46"x48" four high hot rolling mill. Lewis is currently building two of these mills for export to Mexico.

Tool chest firm expands

Huot Mfg. Co., St. Paul 4, Minn., is in the process of completing an annex

ecutive vice-president, this will afford room for added equipment and personnel, as well as speedier service on their line of tool chests, drill indexes



to its factory which will provide approximately 25 per cent additional space. According to Henry Huot, ex-

and dispensers. The addition was expected to be ready for occupancy about March 1.

Men who had to "lick" the very problems you're facing designed... **ROUSSELLE PRESSES**

O.B.I. PRESS

DEEP THROAT PRESS

HORN PRESS

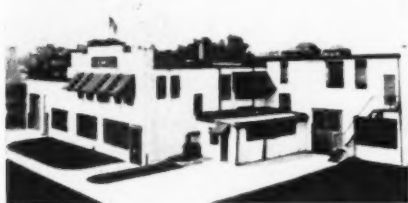
That's why they're fast, accurate, so adaptable, so easy to operate. Why maintenance is simple. Why initial cost is low . . . Often considerable savings and improved punch press operations are possible if you let our engineering staff assist you. There is no obligation. Simply furnish the details relating to your need or problem and if possible send samples or drawings of the work. You will hear from us promptly.

Sold Exclusively Through Leading Machinery Dealers

Rousselle Presses are Manufactured by SERVICE MACHINE CO.
7629-33 So. Ashland Ave., Chicago 20, Illinois

New plant for Service Machine Co.

Completion of a new plant for general tooling and production is reported by I. George Seget, president and chairman of the board of Service Machine Co., Elizabeth, N. J. He stated that the plant area, devoted entirely to en-



gineering, heavy machine manufacture, tool and die making, light assembly and machining, now utilizes 21,000 sq. ft. of floor space and is said to be the largest general machine shop in the north Jersey area.

Equipment includes jig borers, milling machines, boring mills, planers,

slotters, engine lathes, cylindrical grinders, surface grinders, shapers, drilling equipment, saws, power presses and inspection equipment in wide range and variety for high precision machine work, manufacture and tooling.

The location is adjacent to both the New Jersey turnpike and U. S. highway No. 1, with Jersey Central R.R. siding facilities.

LUBENCO - CENTER - LUBE



L.C.L. is compounded to resist scoring. It will not break down under extreme heat and pressure.

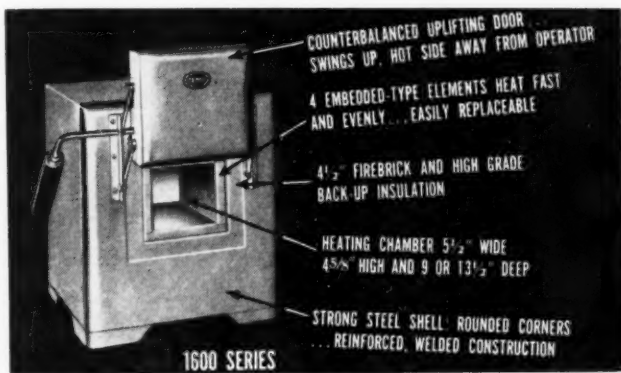
L.C.L. has had fantastic results in innumerable plants where no other product has proven satisfactory. You may try one dozen tubes on a money back guarantee should the application not meet with your expectations. **\$18.00 per doz.**

LUBRICATION ENGINEERING CO.

470 Frelinghuysen Ave. Newark 5, N. J.

solve heat-treat problems

with versatile
Temco bench-
type furnace



Step up production, cut costs with Temco electric furnaces for heat treating dies, parts, tools, etc. Model illustrated above one of eight convenient sizes available with either electronic or manual temperature controls. Economical,



ELECTRIC FURNACES

easy to install and operate, low cost. Priced from \$55.00 to \$507.50. Write for literature and nearest dealer's name.

THERMO ELECTRIC MANUFACTURING CO.

486 HUFF ST., DUBUQUE, IOWA

Smith Welding Equipment Corp. expands engineering and experimental facilities

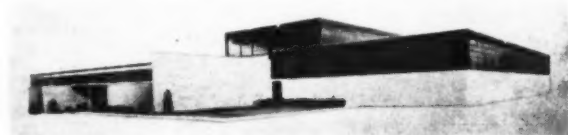
New construction, covering an area of 6,000 square feet, will provide increased facilities for Smith Welding Equipment Corp. of Minneapolis. The new wing practically doubles the engineering and experimental departments and will provide added space for quality control and increased tool production.

Many important improvements in commercial and industrial welding equipment have been attributed to the developmental work carried on in the



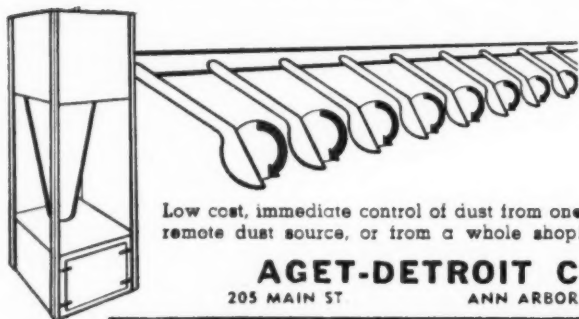
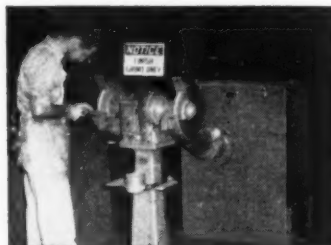
Smith engineering department. Its tool-making department has been expanded to create and build its own special tools, jigs and fixtures. Additional equipment will be installed.

The new plant of Royal Oak Tool & Machine Co., 29800 Stephenson Highway, Royal Oak, Mich. (Detroit suburb).



STOP DUST

with DUSTKOP



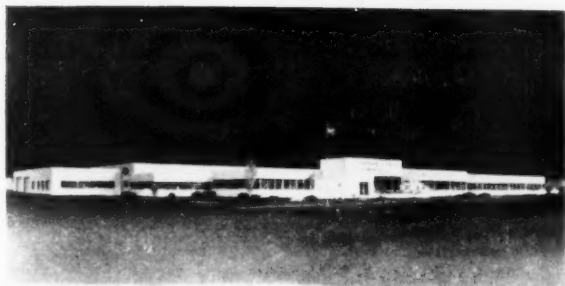
300 cfm to 10,000 cfm
per unit (22 models)
standard, pre-tested,
available from stock.
Ask for catalog 605-2.
No obligation.

AGET-DETROIT CO.

205 MAIN ST.

ANN ARBOR, MICH

The Skinner Chuck Co. has recently completed a new modern plant at Edgewood Ave., New Britain, Conn. It comprises 85,000 sq. ft. of floor space, with every modern facility.



Direct sales distribution for Formsprag

Shepard Barnes, new president of the Formsprag Co., 23603 Hoover Rd., Detroit, announces the termination of a sales agreement with Morse Chain Co. for the distribution of Formsprag clutches.

According to a recent announcement, Paul F. Aaron, previously connected with Crosley Division, Avco Corp., at



S. Barnes

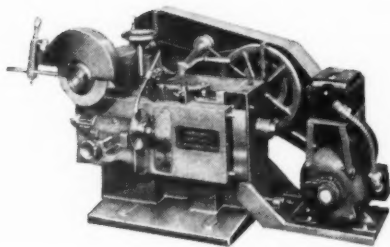


Paul F. Aaron

RESTORES BROKEN SAW TEETH AND SHARPENS THEM in GANGS

Saws can be ganged up, 100 saws at one setting and ground at one time. The 35T Automatic Metal Saw Grinder reclaims them and adds many extra hours of useful life. The saw is fed to the grinder automatically at the rate of 30 teeth to the minute. Grinding is indexed automatically and is accurate to $\pm .001$ ".

WRITE FOR BULLETIN 35T



WARDWELL

Maker of the largest line of
saw and tool sharpening machines

THE WARDWELL MFG. CO.
3165 Fulton Road Cleveland 9, Ohio

3 EXCLUSIVE FEATURES MAKE SUPERIOR Precision All-Steel DIE SETS SAFE and EASY to HANDLE

- 1. Safety Flange**
- 2. Lock Jaw Lifting Device**
- 3. E-Z Lift Sling Chain**



1 SAFETY FLANGE
protects fingers by providing roomy gripping space on either side of the die shoe.



2 LOCK JAW LIFTING DEVICE
removes the danger of handling large die sets. Heavy steel components of this device are welded in place forming an integral part of the die set.

It's no longer necessary to take needless risks in handling die sets. Risks that might easily injure the hands of skilled die makers, ruin costly dies in process or completed, or even damage press equipment. Safety features of Superior die sets have eliminated all of these dangers and have speeded up the overall handling of sets from the bench to the press. Prove to yourself the merits of these safety features in both small and large die sets.

FREE CATALOG

Please state company name and your capacity when requesting this helpful data on die sets and die makers' supplies.

FOR FAST LOCAL SERVICE CALL YOUR SUPERIOR REPRESENTATIVE

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|------------------------------------|--------------------------------|
| Dayton, Ohio — Hamlock 6209 | Chicago, Ill. — Central 6-3869 |
| Dallas, Tex. — Riverside 5138 | Kalamazoo, Mich. — Phone 7988 |
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| Indianapolis, Ind. — Broadway 5668 | |

SUPERIOR STEEL PRODUCTS CORP.
2734 E. 19th ST., MILWAUKEE, WIS.



P. F. Young



W. H. Benson

Richmond, Ind., has been appointed plant manager of The Cincinnati Tool Co. of Cincinnati. This company is a pioneer in the field of manufacturing clamps and other mechanics' hand tools. In this new connection Mr. Aaron will have charge of production planning.

Recent promotions announced by President Robert McCulloch of Temco Aircraft Corp., Dallas, Tex., include: Paris F. "Curly" Young, superintendent

For easier grinding
and mirror finishes in a
fraction of the time



STAR DUST DIAMOND
WHEELS AND HONES

LOOK TO
THE EXPANDED

Star Dust
★ LINE! ★

NOW . . . A COMPLETE RANGE
OF STAR DUST DIAMOND ABRASIVES
FOR EVERY PURPOSE

STAR DUST Laboratory graded
Pure Diamond Powders



Absolute uniformity resulting from laboratory grading is the reason for the success of STAR DUST Diamond Powders and Compounds . . . And the new line of STAR DUST Diamond Wheels and Hones finds immediate acceptance because for the first time this superior diamond quality is combined with a new bonding formula. That means unequalled performance and wheel life.

Be "Laps Ahead" with STAR DUST! Most sizes available for fast delivery. Write for complete information and new comprehensive catalog A-8



STAR DUST
Laboratory
graded dia-
mond lapping
compounds in
18 gram appli-
cator gun . . .
or 5 gram oph-
thalmic tipped
tube.



ACE ABRASIVE LABORATORIES

250 WEST 57TH STREET • NEW YORK 19, N. Y.

of the machine shop; and **Wilson H. Benson**, superintendent of parts and tool control.

Malvern J. Hiler, president of Commonwealth Engineering Co., has recently announced the election of **Dr. Philip R. Marvin** as vice-president. Commonwealth is one of the older industrial research firms in the country engaged in both technical and industrial research.



P. R. Marvin



Wm. H. Bennett

NEW Contour Milling Cutter by DOUGLAS

Patent
pending



CUTTING
SURFACE



Here is the patented, high helix, shear type milling cutter that does a real job on turbine compressor blades, stator vanes, buckets and nozzles, cam generating or any compound contoured surface. The teeth are always in contact with the work, they clean themselves and impart a smooth finish. Douglas milling cutters, by using a special adapter, will fit any milling machine. Standard sizes $1\frac{1}{2}''$ to $3\frac{1}{2}''$. Other sizes upon request.

DOUGLAS TOOL CO.

2300 E. Nine Mile Road
Hazel Park, Mich.



W. A. Meyer



C. E. Schmitz

The Hydraulic Press Mfg. Co., Mount Gilead, O., announces the promotion of **William H. Bennett** to director of engineering. He was assistant sales manager before assuming his new duties. He also served as chief of the forge and press equipment section of the metal-working equipment division of the National Production Authority in Washington.

GREAVES-SILENT BAKELITE GEARS



★ **GREAVES**

THEY'RE STRONG, SILENT!

You'll appreciate the smooth, silent operation of Greaves-Silent Bakelite Gears. You'll marvel at the big power loads they can carry . . . and their remarkable ability to operate successfully when completely submerged in water. Cost is low so you'll save plenty of time, money and labor. Silent gears of rawhide and Fabriol also available.

• WRITE FOR CIRCULAR



IMMEDIATE DELIVERY

on blanks sawed
to specified dia-
meter and face

THE GREAVES MACHINE TOOL CO.

2600 EASTERN AVE. CINCINNATI 2, OHIO

Carl E. Schmitz has been chosen vice-president in charge of sales for Crane Packing Co., Chicago. Serving under Mr. Schmitz are five division sales managers: E. H. Stubenrauch, mechanical packings; Stephen Hawxhurst, molded Teflon products; Harry I. Sole, Lapmaster; V. E. Vorhees, mechanical seals; and Stillman Segar, plastic lead seal.

The Furnas Electric Co. of Batavia, Ill., manufacturers of electric motor controls, announces the appointment of Walter A. Meyer as general sales manager, in charge of sales and publicity. Meyer was formerly with Allis-Chalmers, Milwaukee.

Adamas Carbide Corp., of Harrison, New Jersey, manufacturer of tungsten carbide tool tips, dies and wear parts,

SHUR-LOCK ADAPTER ASSEMBLIES

FIGURE NO. 1

Made to GMC, Ford and Chrysler Standards.

Friction type Shur-Lock micro nut locks any place on adapter threads without damage.

Relieved against possible swelling around Woodruff key, without destroying bearing surface.

Easy adjustment saves set-up time.

National Acme threads afford maximum bearing surface for better fit in spindle.

Widely acclaimed for concentricity. Runout held to absolute minimum.

All sizes $\frac{1}{2}$ " to $1\frac{7}{8}$ ", 0 to number 4 Morse Taper now in stock for immediate shipment.

Specifications shown on forms No. 141 our catalog

New Low Prices

Pictured at the left are other typical Seibert engineered items including: (2) Slip spindle assemblies, (3) Universal joints, (4) Lower joint assemblies, (5) Upper joint assemblies, (6) Pinion drive shafts, (7) Bracket spindle assemblies, (8) Arms.

SEIBERT

Quality

& SONS, Inc.

CHENOA, ILLINOIS

has announced the appointment of **Clyde Smith**, 371 North Olive Street, Elyria, Ohio, as its sales representative in southern Ohio. He was formerly with Firth-Sterling.

Jesse E. Deacon was recently appointed assistant superintendent of the contract division of Taft-Peirce Mfg. Co., Woonsocket, R.I.

Robert E. Anderson has been named president of Robertson Mfg. Co., Trenton, N.J., manufacturers of tile and

grinding wheels. He succeeds **D. P. Forst**, former president, who now is chairman of the board.

Doyle Beasley, formerly general foreman of sheet metal preparation and foundry at Temco Aircraft Corp., Dallas, Tex., has been promoted to assistant superintendent of all night operations.

Charles H. Judd has formed Judd Industries, Inc., Cleveland, Ohio. Mr. Judd was chief engineer at Tinnerman Products for ten years.

step up production with



STOW
flexible shaft
MACHINES



These dependable STOW FLEXIBLE SHAFT MACHINES save production time . . . speed up output . . . help lower production costs. Variable Speed Models shown are easily portable . . . cut down operator fatigue and increase on the job efficiency!

Constant Speed Models available. Also complete line of accessories designed to increase the utility of STOW Flexible Shaft Machines!

WRITE TODAY

for your free copy of CATALOG 51

STOW

Manufacturing Co., Inc.,
30 Shear St., Binghamton, N. Y.

Appointment of **Bennett Burgoon, Jr.**, as sales manager, metal-working division, has been announced by Kennametal Inc., Latrobe, Pa. Burgoon joined the company in 1941.

Harold E. Kleintop of Parkesburg, Pa., has been appointed manager of wire product operations of Hewitt-Robins, of Philadelphia, manufacturers of wire screen cloth and conveyor belts.

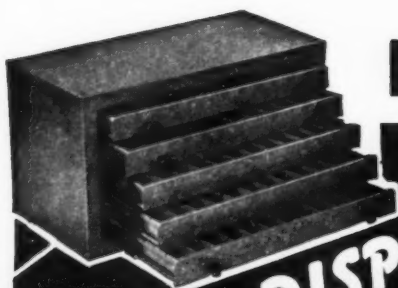
George W. Urban has been appointed purchasing agent of The Cleveland Crane & Eng. Co., Wickliffe, Ohio.



C. H. Judd



D. Beasley



HUOT

DRILL DISPENSER

*Eliminates Rummaging
Through Stacks of Drills*

No more running out of drills—your entire stock can be seen at a glance. Each size of drill has its own compartment with rounded bottom for easy selection. You can store dozens of small drills and several large ones in their own compartments. Built-in pricing or inventory system eliminates the need for cost sheets, and will keep a record of drills on hand. Stack two or three cabinets to save space. *Specifications:* 14½" long, 7¼" high, 7¼" deep. Hammerlin baked enamel finish over rugged steel.

Made in three models for fractional, number or letter drills.

Write for Circular

HUOT MANUFACTURING CO.

563 No. Wheeler St., St. Paul W4, Minn.



By the
makers of
**HUOT
DRILL
INDEX**



G. W. Urban



Bennett Burgoon

W. N. "Buck" Hall has been promoted to superintendent at Temco Aircraft Corp., Dallas, Tex. Herman Muller has been promoted to night superintendent.

Farrel-Birmingham Co., Inc., Ansonia, Conn., has appointed Roger E. Vaughan assistant general manager of its subsidiary, Consolidated Machine Tool Corp., Rochester, N.Y.

Detrex Corp., of Detroit, manufacturer of industrial and dry cleaning equipment and chemicals, has an-

16 HOLES -- THREE PRESSES — ONE OPERATOR!



FITS
ON ANY
DRILL
PRESS

3 QUADRILLS ON 3 PRESSES DO WORK OF
16 SPINDLES AT RING MFG. CO.



Investigate this important
time and work saver.
Write for Catalog Today

QUADRILL

4-POSITION Instantly Adjustable tool drills, taps, reams, countersinks, counterbores — all on 1 drill press with 1 operator. Does work of 4 presses. Costs less than 1 press.

QUADRILL produces more holes faster—No time loss—Cuts production costs 33%.

CHICAGO QUADRILL CO.

1846 BUSSE HIGHWAY, DESPLAINES, ILLINOIS

nounced the election of **P. H. Richey** as assistant treasurer and **F. J. Chmielnicki** as assistant secretary.

Appointment of **Alexander Ross** as chief engineer and **H. R. Sennstrom** as executive engineer has been announced by American Locomotive Co., Schenectady, N.Y.

Hydro-Blast Corp., Chicago, has appointed **Herbert J. Niemann** vice-president in charge of sales; **P. C. Will** vice-president in charge of engineering;

W. F. Gamble secretary-treasurer; **John W. Watson** chief production engineer.

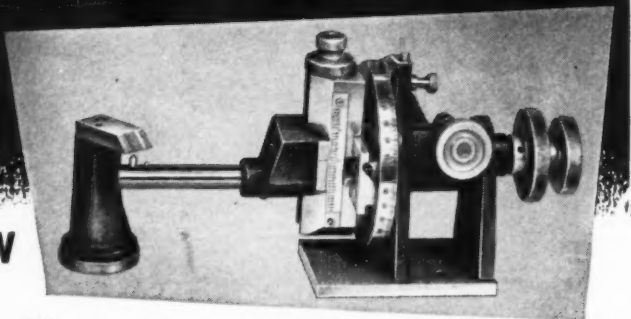
The Taft-Peirce Mfg. Co., Woonsocket, R.I., announces that **Robert S. Ford**, manager of home office sales, was elected deputy assistant secretary and **LaFayette A. Hays** was elected deputy assistant treasurer.

Four promotions were recently announced by Norton Co. following the 68th annual stockholders' meeting in Worcester, Mass.: **John Jeppson** was ap-

Set Up Angle-Tangent-to-Radius Forms

IN MINUTES

with the NEW



Now you can have precision within "tenths" and set up in one-fourth the time. Tangi-Matic has a direct-reading micrometer built in, eliminating "mikes", height gages, Jo Blocks and errors. Even novice operators obtain extreme accuracy. Tangi-Matic dresses any concave radius down to .032", full 180° with equipment we give you. Set-ups can now be made without removing dresser from your grinder chuck.

Our new model has removable dressing arm, permitting the use of extensions for dressing large wheels. Wearing surfaces are hardened, ground and lapped to a mirror finish, assuring you of years of extra service over ordinary dressers. Lead screw is hardened and ground to extreme tolerances. Furnished complete with master setting block, small radius attachment, plastic hood and carrying case. Write for literature and name of representative in your area.



PERFEX GAGE & TOOL CO.

122 Avery Street

Mt. Clemens, Michigan

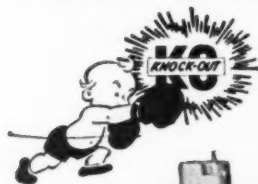
pointed vice president. **A. Donald Kelso** became vice president in charge of foreign operations and a director; **Howard J. Daly** was elected to the board of directors, and **Richard Prouty** was appointed assistant secretary.

As the extensive plant expansion program, which began last May, nears completion, **Herbert B. Clark**, president of Vascoloy-Ramet Corp., Waukegan, Ill., and **Harry W. Highriter**, vice-

president, announced the following organizational changes and modifications, all effective January 1: **George T. Brennan**, works manager; **Paul J. Guentherman**, general superintendent; **Robert E. Bateman**, personnel manager; **Leo Paluska**, purchasing agent; **Clifford J. Nauta**, manager of sales promotion and publications; **John M. Allen**, sales manager of the eastern region; **Burton Naden**, sales manager of the central region; **Quentin H. Castricone**, sales

There's a reason **76%***

of all popularly-priced Tool and Cutter Grinders
sold in 1952 were *"Knock-Outs"*

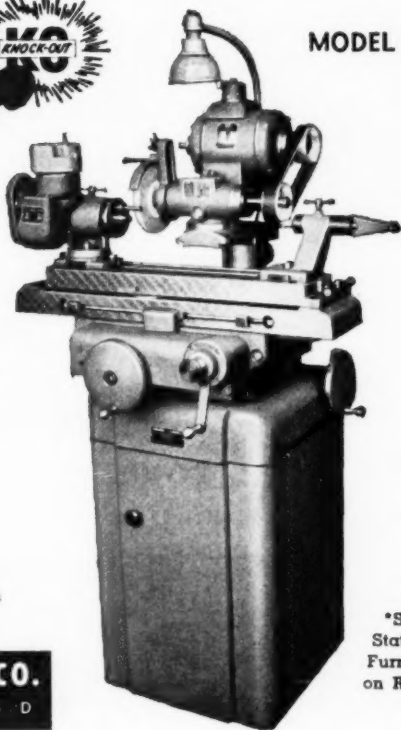


MODEL B860

Will do
anything that
machines
costing 2 or 3
times more
will do . . .
yes and in
less time.

Distributed
Only Through
Franchise
Dealers

K. O. LEE CO.
ABERDEEN, S. D.



*Sales
Statistics
Furnished
on Request

manager of the western region; **Russell O. Moore**, sales manager of mining tools; **Dwight F. Clark**, sales manager of investment castings; and **L. K. Adams**, manager of export sales.

Sales & Service Machinery Co., 3818 Chestnut St., Philadelphia 4, Pa., has been appointed exclusive distributor for the **Rockford Machine Tool Co.** in eastern Pennsylvania, southern New Jersey and Delaware.

J. C. Kuhn has been named vice-president in charge of sales of the **Atkins Saw Division** of **Borg-Warner Corp.**, according to an announcement by **Stanley J. Roush**, divisional president. Mr. Kuhn was formerly vice-president and director of sales of **Morse Twist Drill & Machine Co.**, New Bedford, Mass.

Skinner Electric Valve Division of the **Skinner Chuck Co.** announces the

SIGOURNEY

M-100

THE PRECISION BENCH DRILLING MACHINE

ACCURATE because table and column exactly squared one to the other.

LONG LIFE because of hardened and ground spindles.

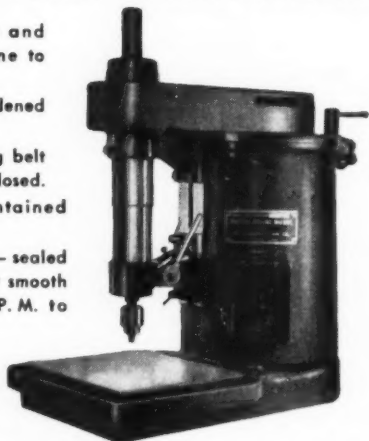
SAFE because motor, driving belt and spindles are entirely enclosed.

STRONG, RIGID for maintained accuracy.

SMOOTH AT HIGH SPEEDS — sealed ball bearings throughout for smooth operation from 4000 R. P. M. to 10,000 R. P. M.

MODELS — with 1, 2, 3 and 4 spindles.

Send for illustrated bulletin.



THE SIGOURNEY TOOL CO.

Hartford 6, Conn.

Sole Sales Agent

PRATT & WHITNEY

Division Niles - Bement - Pond Co.

West Hartford, Connecticut

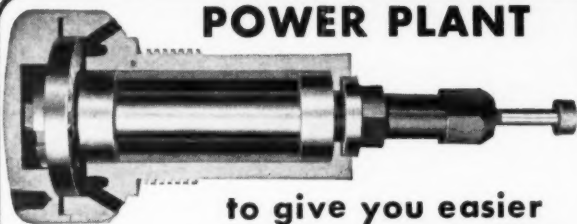
1962

appointment of **William E. Rogers** as sales manager. Mr. Rogers was formerly manager of ball bearing distribution and coaster brake sales for New Departure Division of General Motors. He will have charge of distribution and market research in connection with solenoid valves.

The board of directors of Emhart Mfg. Co. has elected **Warren E. Hill** vice-president in charge of operations, thereby creating a new post. Mr. Hill's

activities will be with all Emhart operating units, which include Henry & Wright, manufacturers of high-speed automatic presses; the V & O Press Co., power press manufacturers; and Hartford-Empire, makers of glass-making machinery.

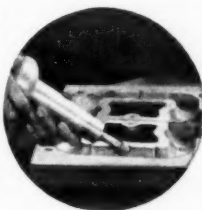
Arnold I. Thorsen, works manager, Allis-Chalmers Mfg. Co., Norwood Works, has been appointed assistant director of manufacturing of the firm's general machinery division, according



POWER PLANT

**to give you easier
lower cost grinding**

Use an Onsrud Air Turbine Grinder just once, and you'll never want any other kind. High efficiency turbine keeps grinding wheel turning full speed under load. No annoying RPM slow-up to slow-up your work. High air turbine speed lets you use low cost, small diameter wheels . . . give right speed for fast work. Always runs cool . . . light in weight. Grease packed bearings save on tool maintenance.



For information . . . write for free Onsrud Grinder Bulletin 1129

ONSRUD MACHINE WORKS, Inc.

3908 Palmer Street

Chicago 47, Illinois



**B-1B
AIR TURBINE
GRINDER
75,000 RPM**



**D-1A
AIR TURBINE
GRINDER
50,000 RPM**



**E-1A
AIR TURBINE
GRINDER
38,000 RPM**

Onsrud®

**America's leading
AIR TURBINE TOOLS**

to an announcement by J. D. Green-sward, vice-president and director of manufacturing of the division. **J. F. Costigan**, assistant works manager at Norwood, has been named the new works manager replacing Thorsen, it was announced by P. F. Bauer, general manager at Norwood, Ohio.

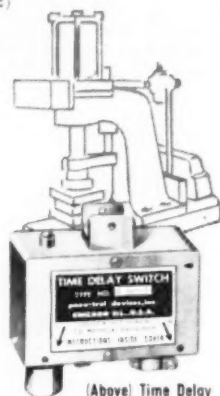
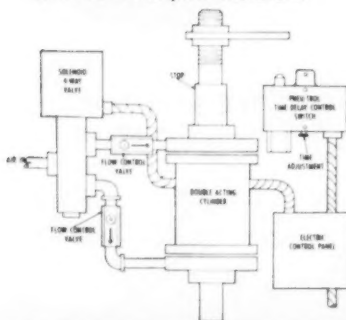
Henry F. Banzhaf has been named to the newly created post of manager of sales of Allis-Chalmers' control operation, Hawley Works, according to

F. C. Ludington, manager. The plant produces motor control apparatus. Other new appointments for the Hawley Works include: **H. A. Wright** as assistant manager of sales; **T. B. Montgomery**, chief engineer; **H. W. Cory**, assistant chief engineer; **T. H. Bloodworth**, engineer-in-charge, industrial control design; and **H. E. Reichert**, engineer-in-charge, railway and marine design.

Get MORE EFFICIENCY... INCREASED PRODUCTION from Air Operated Machines

Pneu-Trol Flow Valves and Time Delay Switches give air operated presses, fixtures and machines three advantages: (1) safe power stroke speed for both operator and workpiece, (2) power stroke timed at work position to permit air pressure build-up to proper work maximum and (3) fast return stroke. Ideal for arbor, drill and punch press work, burnishing, spinning, metal cutting, etc. Diagram below illustrates a typical Flow Valve, Time Switch setup.

Write for descriptive literature.



(Above) Time Delay Switch and (Left) Flow Valves are compact, permit consolidated installations



Pneu-Trol Devices, Inc.
1440 N. Keating Ave., Chicago 51, Ill.

P. T. Egbert, president of American Locomotive Co., Schenectady, N. Y., announces appointment of executives to new positions as a key move in an administrative reorganization of the company. The new vice-presidents are: **Hunter Michaels**, in charge of operations; **D. W. Cameron**, manufacturing; and **Manuel Alonso**, foreign sales. **H. L. Weinberg**, director of engineering, lists the promotion of **Kendall B. Rowell** to chief engineer.

Earl D. Foster has been named superintendent of gas turbine production in Solar Aircraft Company's manufacturing division at San Diego. Foster, who has been with Solar 19 years, was formerly assistant to the San Diego plant manager.

Appointment of **William B. Daub** as assistant advertising manager for industrial products was announced today by **Storrs J. Case**, advertising manager of Sun Oil Co. Formerly a special

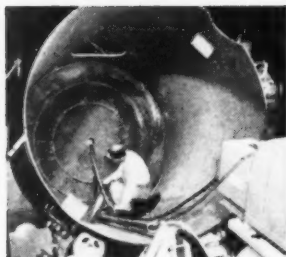


Fig. 1. Fabricates Tank from $\frac{1}{2}$ " plate with "Manual Lincolnweld". Welding speed is 12 to 15 inches per minute at 400 amps. "Manual Lincolnweld" unit, shown above, operates from regular 600 amp. Lincoln "Shield Arc" welder.

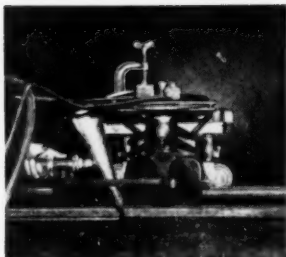


Fig. 2. Welding outside vertical seam with "Manual Lincolnweld" gun mounted on simple rail fixture. Welding speeds are from 2 to 4 times faster than conventional hand welding.

"Manual Lincolnweld" cuts costs 67% ...eliminates joint preparation

USE of "hidden arc" welding with granular flux and positioners is cutting welding costs two-thirds in the fabrication of circuit breaker tanks at the Santa Clara plant of the Pacific Electric Manufacturing Corp. Exterior and interior welds are produced by positioning the welding gun of "Manual Lincolnweld" in a simple fixture. The work is then rotated beneath the welding gun with power rollers.

Currents of 375 to 400 amps concentrated on $\frac{5}{16}$ " electrode produce full penetration at 12

to 15 inches per minute without need for plate preparation. Welds are self-cleaning to eliminate costly time in removing slag between passes as needed on conventional hand welding practice.

Undoubtedly results like these can be duplicated in your shop today. Consult a Lincoln welding engineer. Learn what new Lincoln developments in faster, easier welding can be applied to your operations to improve the quality of your work and cut production costs.

THE LINCOLN ELECTRIC COMPANY DEPT. 3602, CLEVELAND 17, OHIO

The World's Largest Manufacturer of Arc Welding Equipment

representative for Sun's industrial advertising department, Mr. Daub joined Sun Oil Co. in 1945, after having served three years as a technical consultant to the Corps of Engineers of the United States Army.

Stamco, Inc., of New Bremen, Ohio, manufacturers of slitting, shearing and corrugating equipment, announce the promotion of the following men, all of whom have had years of service with the company.

Elton W. Bruns has been appointed chief engineer, after having served for 16 years as chief draftsman.

Richard E. Black has been appointed sales and service representative. Black formerly served 6 years in the engineering department.

Myron L. Kuck, with more than 11 years of service in the engineering department, has been appointed to the position of chief draftsman.

LEVIN[®]

**MICRO-DRILL
PRESS**

for holes
as small as .002"



Write for Bulletin H describing the Micro-Drill Press and listing collet sizes. Louis Levin & Son, Inc., 782 E. Pico Blvd., Los Angeles 21, California.

Designed to hold small drills in precision collets. Absence of a sliding quill guarantees extreme sensitivity with finger-tip control. A mounted $\frac{1}{8}$ " capacity drill chuck can also be used.

The appointments of **Harold D. Newell** as consulting metallurgist and **John J. B. Rutherford** as chief metallurgist of the tubular products division of the Babcock & Wilcox Co. have been announced by **Luke E. Sawyer**, vice-president. In his new post Mr. Newell will devote his time to specific metallurgical problems. Mr. Rutherford will now be in charge of the research section of the laboratory, process and product development and customer metallurgical service.

Three new appointments have been announced by **A. C. Buehler**, president of the Victor Adding Machine Co., Chicago, Ill. They are **Charles Strong**, chief industrial engineer; **George Uhlig**, quality and inspection director; and **Robert Hoffman**, foreman of defense contract work.

N. L. Andrus has been chosen general sales manager for Smith Welding Equipment Corp., it has been an-

SAVE 3 WAYS WITH A



CHECK THESE PRICES

| Furnace Size | 2000° | 2300° |
|--------------|-----------|-----------|
| 6x 6x12" | \$ 467.00 | \$ 548.00 |
| 9x 9x18" | 647.50 | 764.00 |
| 12x12x24" | 912.00 | 1068.90 |
| 18x18x36" | 1419.75 | 1629.50 |

Complete with 100% automatic electronic controls.

ELECTRIC FURNACE

1 SAVE with a Lucifer Electric Furnace on **FIRST COST.** Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces . . . feature by feature . . . you'll save money on the Lucifer Electric Furnace **EVERY TIME.**

2 SAVE ON **MAN HOURS** with a Lucifer Electric Furnace. Less operator attention needed—Lucifer controls are **EXACT.** They reach **SPECIFIED** heat rapidly and retain **SPECIFIED** temperature without variation. No special experience required when you use a Lucifer Furnace.

3 SAVE on maintenance expense with a Lucifer Electric Furnace. Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed . . . long lived . . . trouble free. You save three ways with a Lucifer Electric Furnace. More than two thousand satisfied users.

WRITE for **FREE** literature, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering advice without obligation.

GILBERT S. SIMONSKI COMPANY

Route No. 611

Neshaminy, Pa.

Phone Hatboro 0411

Sole Manufacturers of Lucifer Electric Furnaces

nounced by L. L. McBurney, president of the company. In his new position, Mr. Andrus will be responsible for the sale and distribution of the company's products in both the domestic and foreign markets.

Standard Horse Nail Corp., New Brighton, Penn., announces the following appointments: **R. S. Merrick**, vice president, director of purchases; **W. C. Sheers**, manager production and quality

control; **H. K. Anderson**, supervisor customer service; **Mrs. Alice Kifer**, assistant supervisor order and invoicing department.

The Macchine Industriali Soc. Acc. (MISAL) has opened a New York office for the purpose of offering technical and commercial advice to U. S. customers on its Cervinia milling machines. Address of the new office is Misal Machinery, Inc., 1 East 53rd Street, New York 22, New York.



ANOTHER GRINDING ROOM PROBLEM SOLVED!

The small, precision-built machine you see above is the Radi-Form, a grinder attachment, that does almost everything but talk. The Radi-Form can move the work in a pre-determined arc of any desired radius, from 1/16" to 2" concave, from .00 to 2" convex, which means that radii can now be generated even on carbide tipped cutting tools in a matter of minutes, to within .0005 accuracy on a standard, unformed, cupped diamond wheel. You save headaches, time, and gain increased production. Write for literature and prices that will surprise you.



W. F. MEYERS CO., INC., BEDFORD, INDIANA

Solar Steel Corp. buys United Steel Products, Inc.

It was recently announced by Sol H. Friedman, president of the Solar Steel Corp., in Cleveland, Ohio, that they had purchased the business of the United Steel Products Inc., of Worcester, Mass.

With this new addition, Solar now has eight plants located on the Atlantic seaboard, in the North Central states and in the midwest.

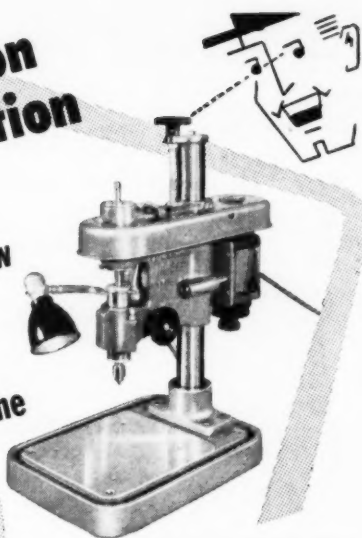
Hallowell of SPS gets metal trades award

H. Thomas Hallowell, Jr., 44-year-old president of Standard Pressed Steel Co., Jenkintown, Pa., has been named to receive the 1952 achievement award of the National Metal Trades Association for an outstanding contribution in the field of industrial relations.

A. L. West was elected treasurer of the Clearing Machine Corp., Chicago,

**Attention
production
men!**

**here's how
to
reduce
costly
downtime**



It will pay you
to write for
Free Bulletin
No. 181

Dynamometers
Static
Balancers
Precision
Drilling
MACHINES

In production drilling, there's a definite relationship between **PRECISION** and **DOWNTIME** . . . Precision machines pay off even though you do not need to hold close tolerances . . . Increased precision prolongs machine life and reduces maintenance work . . . That's why Taylor

HI-EFF Drilling Machines are ideal for long production runs . . . The superb precision features built into each unit result in important savings through greatly reduced downtime.

**TAYLOR DYNAMOMETER
AND MACHINE COMPANY**

528 W. Highland Avenue, Milwaukee 3, Wisconsin



H. T. Hallowell



A. L. West

at a board of directors meeting held recently. West joined the Clearing organization in 1937.

Superior sets new profits rise

Superior Tool & Die, Detroit, Mich., has announced that final net profits for the fiscal year ended Nov. 30, 1952, amounted to \$480,008, equal to 68 cents per common share on the 595,945 shares outstanding. This compares with \$351,-817 and 59 cents in the previous fiscal year.

Step up Production

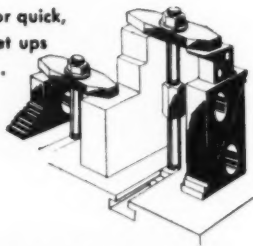
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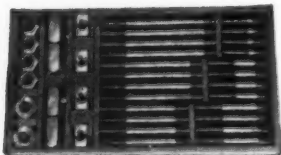
SURE GRIP STEP BLOCKS

FOR MILLERS—SLOTTERS
JIG BORERS—PLANERS
RADIAL DRILLS—LATHES

... used for quick,
accurate set ups
like this ...



and HANDY STUD SETS



Stud sets consist of 40 pieces and provide requirements for at least 4 clamps from 3" to 15" high with T nuts for your table slot.

there's a size to fit your machine

write for free illustrated catalog

TIETZMANN TOOL CORP.

315-317 N. MAIN ST. • DEPT. A • ENGLEWOOD, OHIO

Irving C. Bolton, director and financial vice president, Warner Swasey Co., Cleveland, Ohio, died February 11.

Reorganization of Buckeye Brass

Reorganization of the 52-year-old Buckeye Brass and Mfg. Co., 6410 Hawthorne Ave., Cleveland 3, Ohio, was recently announced by the new president, **Don F. Shook**.

Charles Arthur Booth, 76, executive vice president of Buffalo Forge Co., Buffalo, N.Y., died in Buffalo General Hospital after a short illness. Mr. Booth, a graduate of Worcester Polytechnic Institute, started with Buffalo Forge Co. in 1900, became sales manager in 1907, vice president and director about 1917.

The Keystone Chromium Corp., of Buffalo, N.Y., has been licensed as a

GET THE FACTS

About Hardness Testing

Everything you need to know about hardness testing is told in this handsome book, prepared by the makers of the internationally respected CLARK Hardness Testers for "Rockwell Testing." Simple, easy-to-read text (in English) and numerous illustrations show the equipment and procedure for fast, accurate hardness testing of ferrous and non-ferrous materials. If you would like a copy, *free of charge*, just attach this ad to your letterhead or write "Send book." A copy will be mailed to you promptly.

P.S. If you are interested in descriptions and prices for CLARK Hardness Testers (Standard and Superficial) of *guaranteed accuracy*, say the word and we'll gladly supply them.



CLARK INSTRUMENT INC.

10206 Ford Road • Dearborn, Mich., U.S.A.

custom processing plant for the Electrofilm Lubelok process in the Buffalo area.

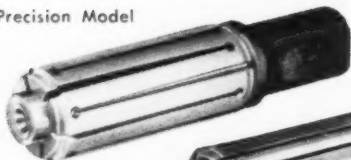
Service Machine Co., Elizabeth, N.J., announces completion of a new plant, for general tooling and production, utilizing 21,000 sq. ft. of floor space.

The recently organized Romulus Tool & Eng. Co., Romulus, Mich., will be owned and operated by **Joseph Player** and **Edward Halik**, both former employees of Turchan Follower Machine Co.

The newly-completed New Philadelphia, Ohio, plant of the Warner and Swasey Co., Cleveland, builders of machine tools and precision instruments, went into operation Feb. 16, the company announced. Costing approximately \$1,500,000 and providing 137,000 sq. ft. of manufacturing floor space, it has been added for the purpose of making parts and minor assemblies which will be shipped to the company's main plant in Cleveland.

CHAMPION E-X-P-A-N-D-I-N-G MANDRELS

Precision Model



Standard Model



**give
speed to
every set-up**

The flexible sleeve, mounted on tapered arbor, expands automatically to fit the hole. Inserted by hand — no arbor press needed. Always an exact, positive, concentric fit. Locked by a single mallet blow. Unlocked the same way. CHAMPION Expanding Mandrels are used in machine shops around the world. Save time, cut production costs, whether the job calls for machining one piece or a thousand.

Precision Model has expansion range of .010". Available in regular sizes to fit holes from 1/2" to 3" diam. Holds work to tolerances of .0002" run-out. Guaranteed for precision grinding, turning and milling operations.

Standard Model maintains close tolerances, handles material of any length bore, hard or soft metals — from thin tubes and bushings to heavy castings and forgings. A set of fourteen will fit every hole from 1/2" to 9 1/2" diam.

CHAMPION Expanding Mandrels can be made in special shapes and sizes to fit any specifications. Quotations on request. Write for descriptive folder today.

WESTERN TOOL & MFG. CO., INC.

Dept. 27

Springfield, Ohio

Gerald Stedman, writer, dies

Gerald Eldridge Stedman, age 56, of Beaver Lake, Wis., and Chicago, publisher of "Private Executive Report," 415 N. Dearborn St., Chicago, passed away Jan. 21, 1953, at St. Joseph's Hospital, Milwaukee, Wis., after a six months' illness. Death was caused by cerebral hemorrhage.

Mr. Stedman was widely known in advertising and business writing fields, contributing to MACHINE and TOOL

BLUE BOOK during World War II and post-war years. He was formerly vice president of Grinnell and C. C. Win-ningham Agencies, Detroit, during the '20's, vice president of Cramer-Krasselt Co., Milwaukee, from 1929 to 1939. Throughout his career he was extremely active in sales and merchandising writing. During World War II he expanded his writing activities, becoming the most widely traveled industrial writer in the country.



STOP the major cause of **TAP BREAKAGE**

increase tap life 5 to 10 times
with **TAP-CARTRIDGES**

Drop TAP-CARTRIDGE into drilled hole; tap hole through cartridge; chips are imbedded in wax and forced out of hole. Tap is protected every thread of the way.

- very economical
- saves time and labor
- eliminates torn threads
- no cleaning-out operation required
- facilitates thread-cutting to bottom of hole
- available for tap sizes from No. 2 up and for any depth of drilled hole

For full details write to the . . .

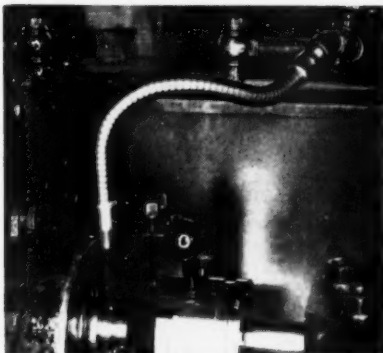
TAP-CARTRIDGE CO.
1638 CENTRAL PARKWAY
CINCINNATI 10, OHIO



JOHNSON FLEXIBLE METAL OILFEED AND COOLANT LINES FOR CONVEYING

**COOLANTS, AIR, CUTTING
OILS AND LUBRICANTS**

**WILL
"STAY PUT"
WHEN BENT**



Write for Bulletin O.F.L. No. 1

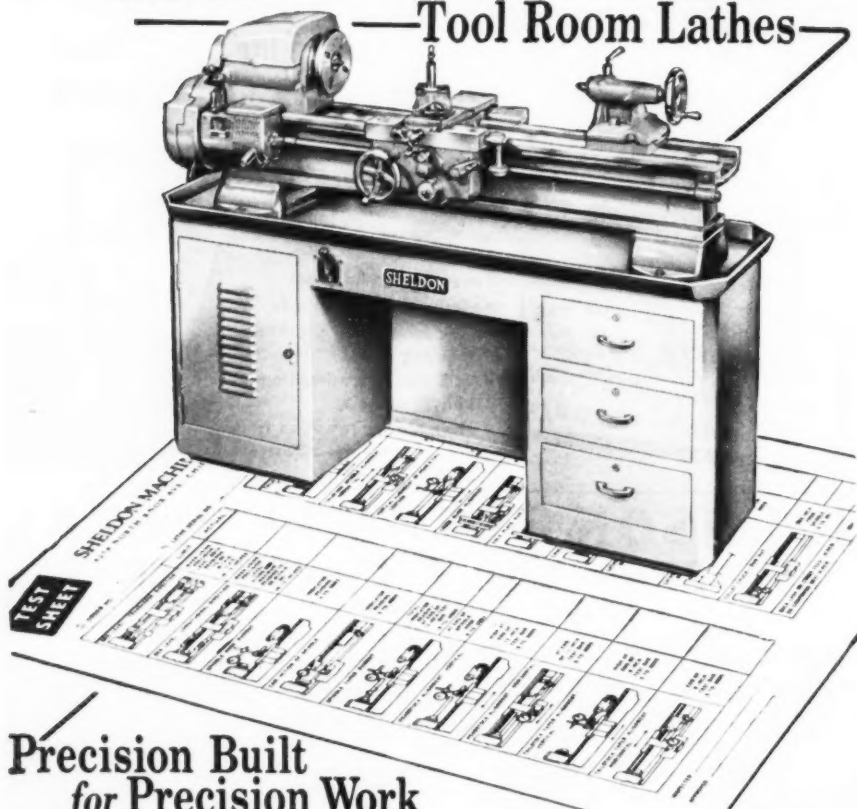
JOHNSON METAL HOSE, INC.
100 SPERRY ST. WATERBURY 20, CONN.

SHELDON

CHICAGO

U. S. A.

Tool Room Lathes



Precision Built for Precision Work

Each SHELDON Lathe is a precision machine tool that in final inspection has passed the 19 accuracy checks on the SHELDON "Inspection Test Sheet."

Produced by modern

methods with the finest special machines, these 10", 11" and 12" (swings 13") lathes are quality built on a quantity production basis. Selling at quantity production prices they are today's best lathe values.

SHELDON MACHINE CO., INC.

4242 North Knox Ave.,
Chicago 41, Illinois

What's New

IN

METALWORKING

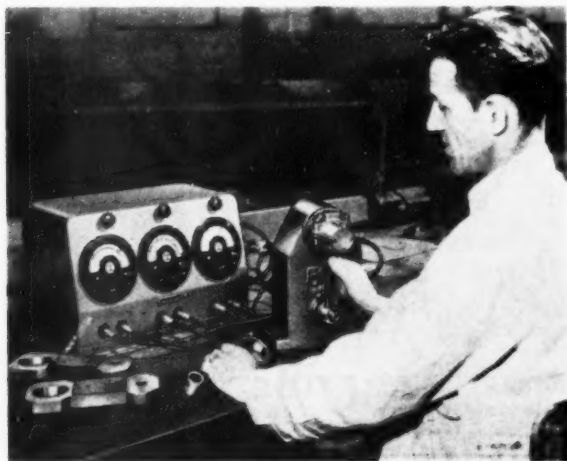
Computing Air Gage Indicator

CLAIMED TO BE a significant development in air gage design, The Taft-Peirce Mfg. Co., Dept. BB, Woonsocket, R. I., announces its Computing CompAIRator.

Through the use of the instrument, it is claimed to be possible to remove the effect of one of the variables (diameter) on the results shown by the indicator for value of angle of taper, concentricity, and clearance by applying

the diameter variation to both sides of the differential measuring device, nullifying its effect on the reading obtained on the dial.

Because of variables involved, the use of air gaging as applied ordinarily to multiple and complex measuring problems such as checking of tapered cylindrical parts, center distances, squareness between face and bore, concentricity, etc., it is generally necessary to



This shows 3 Computing CompAIRators in operation. This 3 dial unit, which takes the place of 6 standard indicators, is checking the center distance, bend, and twist of a connecting rod.

use at least two air circuits and a like number of indicators.

By using this new comparator, it is possible to obtain readings for these dimensional characteristics on a single dial with a single pointer that is said to result in greater speed, accuracy, convenience and economy.

Electric deodorizer

The Abbeon Supply Co., 179-15 Jamaica Ave., Dept. BB, Jamaica 32, N.Y., has announced its new Rid-All deodorizer that is said to completely rid homes and all buildings of odors.

Using the Westinghouse Odorout bulb, there are no chemicals; the bulbs emit light rays on a wavelength that makes the oxygen in the air become ozonated. Odors that come in contact with the ozonated air are oxidized or burned.

One set is claimed to deodorize spaces up to 1,800 c.f. Bulbs last for 6 months' continuous use.

The complete unit weighs 2 lbs. and measures 6 $\frac{7}{8}$ "x4 $\frac{5}{8}$ "x2 $\frac{1}{4}$ ".



STOP DUSTS INSTANTLY

with

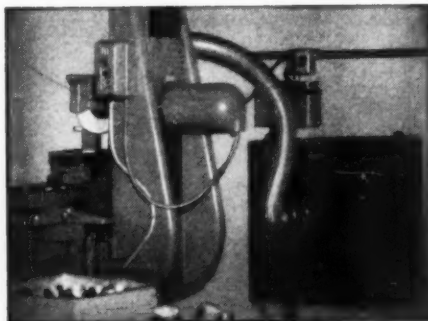
DUSTKOP

Available from stock of 22
standard models

300 cfm to 10,000 cfm

for: Surface Grinders, Tool and Cutter Grinders; Polishers and Buffers; Abrasive Belts and Discs; Woodworking and Plastic Industry Equipment . . . DUSTKOPS collect almost all kinds of industrial dusts.

Ask for Catalog 605-2. Describe dust problems for recommendation by return mail — no obligation.



AGET-DETROIT CO.

502 Main St.

Ann Arbor, Michigan

Cincinnati No. 2-24 Automatic Milling Machines

A new line of automatic milling machines, having a number of advanced production features plus several unique features for convenience and simplification of setup, has been announced by The Cincinnati Milling Machine Co., Dept. BB, Cincinnati 9, Ohio. These machines are built in plain, duplex, and plain rise and fall styles; powered at

the spindle by 3 or 5 h.p. motors. Standard table travel is 24" although longer table travel, up to 144", may be obtained for long, comparatively light work.

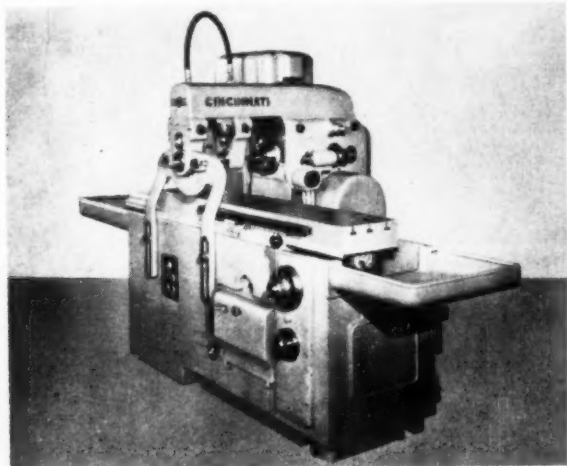
It is claimed that automaticity and maneuverability have been combined to an unusual degree for production type milling machines. Through a cycle

selector unit, a single lever initiates the complete milling operation, including automatic table cycle, automatic spindle stop, automatic backlash eliminator, automatic spindle carrier cycle of rise and fall machines, and one extra equipment item, a automatic spindle retraction. To aid in setting up the machine, all these automatic features can be nullified or bypassed for manual control.

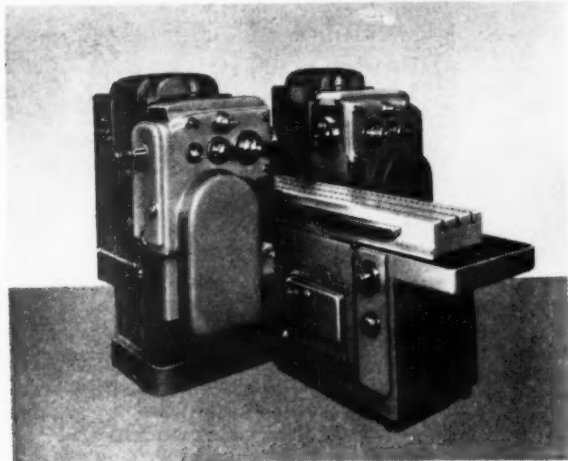
An individual motor drives the spindle through V-belts and three gear contacts; 3 h.p. per spindle for standard spindle speeds, and 5 h.p. for high spindle speeds. The spindle is quill mounted for cross adjustment. Bearings, gears, and all other parts within the spindle carrier unit are automatically lubricated by means of a combination circulating and splash system.

The walls of the bed are considerably wider than the table, and the intervening space serves to catch the coolant and chips, keeping the floor clean and dry.

Table ways are automatically pressure lubricated with filtered oil and completely protected



New Cincinnati No. 2-24 plain automatic milling machine.



New Cincinnati No. 2-24 duplex automatic milling machine.

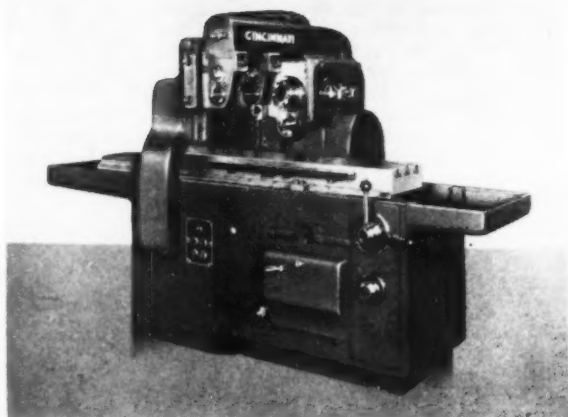
against entrance of dirt, chips, and coolant. The standard table is extra long, 55 $\frac{1}{2}$ " from end to end. The table is traversed through a conventional screw and nut arrangement and powered by a separate 2 h.p. motor mounted on hinged rails in the bed.

The sequence of all automatic functions is controlled by the cycle selector, actually an assembly of cams on a rather short demountable shaft in the bed. Dogs control the length of stroke only. Cycle selectors have been designed for almost every conceivable automatic cycle. They may be changed in less than a minute's time when changing setups, and are interchangeable with cycle selectors for the company's No. 0-8 automatic milling machines.

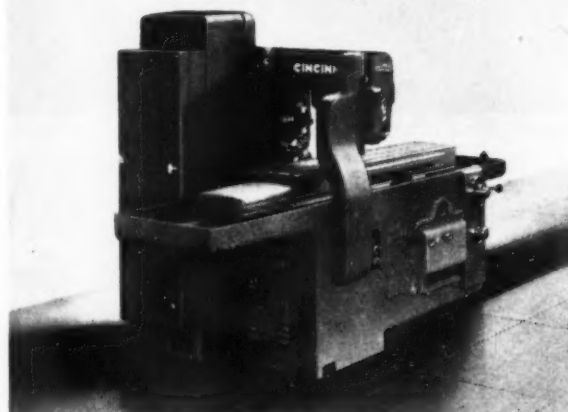
Twenty spindle speeds range from 30 to 1200 r.p.m. They are obtained through change gears and an externally operated back gear.

Vertical feeds for the spindle carrier of r.a.f. machines are infinitely variable from 1" to 40" per minute, obtained through a dial control. The standard r.a.f. machine feeds down only, and rapid traverses up and down at the rate of 100" per minute. However, the machine can be arranged to feed up and down for box milling.

Extra equipment available for Cincinnati No. 2-24 automatic milling machines includes automatic quill retrac-



New Cincinnati No. 2-24 plain automatic rise and fall milling machine.



Rear view, new Cincinnati No. 2-24 plain automatic rise and fall milling machine.

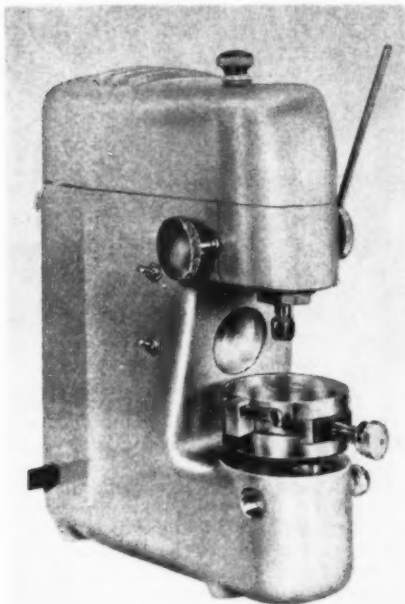
tion. Just before the return stroke of the table, the spindle automatically retracts 1/32". In both advanced and retracted positions, the spindle is automatically clamped. Another useful extra equipment item will be found in the cam roller attachment. In effect, ma-

chines equipped with the latter unit are variations of the r.a.f. style. Cams can be milled having a maximum rise of 30° and maximum drop (milling down-hill) of 80°. A high series of spindle speeds, 60 to 2400 r.p.m.; two high series of table feeds up to 80" per minute; and a low series of table feeds are also available.

Micro precision drilling machine

S. N. Bridges & Co., Ltd., London, S.W. 6, Eng., is making an attractive precision drilling machine that is being distributed in this country by Marton Equipment, Inc., Dept. BB, 4 Essex St., Beverly, Mass.

Specifications are: drilling capacity,



.05 mm. to 4 mm.; motor, A.C. single phase only, 110, 220/210, 220/240 volts; drill spindle speeds up to 7,500 r.p.m.; stroke of quill, 1"; throat depth, 2½"; table dia., 4"; maximum clearance, collet to table, 4½"; base overall, 12½" x 7"; overall height, 16½"; net wt., 45 lbs.

Some of the features include: removable cover; depth stop micrometer ad-

Attach this page to
your letterhead and
forward for our new
16 page catalog

ACTUAL SIZE ▶



CONICAL TOOL CO.

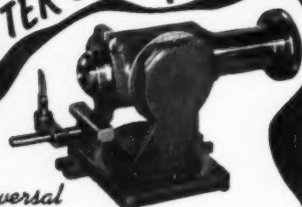
3801 Buchanan S.W.
Grand Rapids 8, Michigan

NOW! A LOW-COST CUTTER GRINDING FIXTURE

The

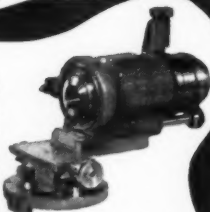
Universal

CUTTER GRINDING FIXTURE fits any universal tool or surface grinder. The basic unit, shown here (standard accessories not shown), with its four attachments, below, provide a quick and accurate answer to nearly all cutter and tool grinding demands.



Precision BALL END MILL

grinding is done with this compact, easily-operated fixture. An exceptionally flexible instrument, it grinds up to 2 1/4" dia., sets at any angles or radius with any cutting clearance on square, conical or ball nose shaped end mills.



◀ The MULTI-SWIVEL VISE attachment employs three swivels for quick set-up of any compound angle.



◀ This versatile INDEXING LOCK BRACKET may be set up in any position at either end of spindle housing on basic unit.



◀ For precision GRINDING WHEEL DRESSING this attachment will handle any two angles as well as set radius.

Send for descriptive literature.

Several good territories in U. S. and Canada are open to qualified representatives. Write:

**ROCHELEAU
TOOL AND DIE CO.**

650C No. Main St. Leominster, Mass.

Export Office: States Trading Co.
401 Broadway, New York 13, New York
Cable Address: STRADESO, N. Y.

justment; built in floodlight; standard table; ventilation through cooling louvres; fixed stop for setting drilling to pre-determined depth; knurled hand feed for precise feeding which is also drilled and tapped for bar; capstan type turret locking screw locks table in position.

Diaphragm chuck for heavy machining

A new air operated diaphragm chuck, now in production, employs a simple, compact booster mechanism within the self-contained air cylinder, which gives wider adaptability and improves per-



formance, claims the manufacturer, Sheffer Collet Co., Dept. BB, Traverse City, Mich.

The stepped up power permits the use of a stiffer, heavier diaphragm which not only assures a higher torque factor, but repeating to extreme accuracy under production conditions. Likewise, the heavier diaphragm makes possible smaller chuck diameter and less overhang with greater compactness and less weight.

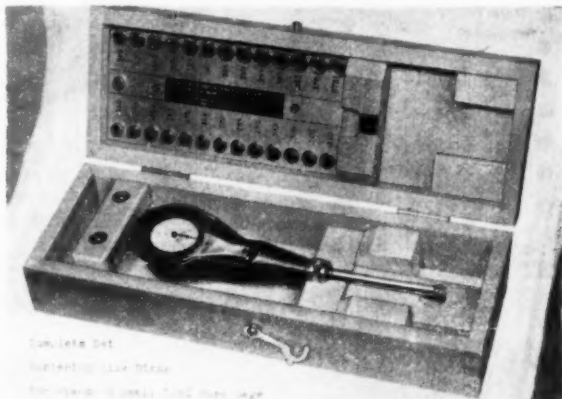
Positive stops are provided in the design. With multiplied power, full jaw opening is assured on each cycle regardless of fluctuating line pressure, but overdistortion of the diaphragm is prevented by the stops built into the mechanism.

Sets of Centering Size Discs for no. 00 Dial Bore Gage

As a development of its small bore gage, Standard Gage Co., Dept. BB, Poughkeepsie, N. Y., announces complete sets of centering-size discs whereby this gage can measure any bore within its over-all range of $\frac{1}{4}$ " to $\frac{3}{8}$ ".

Previously this No. 00 gage had been presented as a "single-hole" gage to be furnished with a centering-size disc proper for the checking of the one dimension to be specified by the user. Now, however, there are available com-

This shows the set of centering size discs for the small No. 00 dial bore gage for checking the complete range of bores within the range .250" to .375".



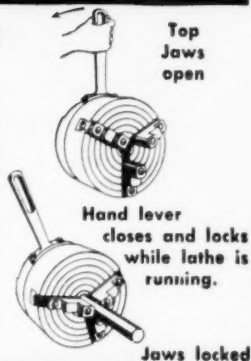
Complete Set
Centering Size Discs
for use with No. 00 Dial Bore Gage

Labor Saving Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days. Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.

Write for bulletin 201 today.



CHUCK DIVISION
THOMAS HOIST CO.
24 S. HOYNE CHICAGO 12, ILL.



REHNBERG-JACOBSON DRILL UNITS

Self-contained Drill Units are fully-automatic and cam-operated for positive quill action. They come in five sizes with drill capacities ranging from 3/16" to 1-1/2" (in mild steel).

These units are all available for quick delivery. You can mount them on structures of your own to make practical and efficient production machine tools.

Write for Literature

REHNBERG-JACOBSON MFG. COMPANY

DESIGNERS & BUILDERS OF
SPECIAL MACHINERY

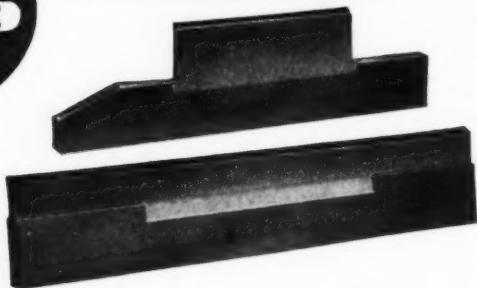


2135 KISHWAUKEE ST.
ROCKFORD, ILLINOIS



Standard thrufeed and in-feed work support blades available from stock. Prices on special blades quoted on receipt of prints.

CARBIDE TIPPED
Work Support Blades
for CENTERLESS GRINDERS



SPECIAL TOOLS—Prompt quotes on receipt of prints

WILLEY'S CARBIDE TOOL CO.

SOLE MAKERS OF WILLEY'S METAL

1342 W. Vernor Highway

Detroit 1, Michigan

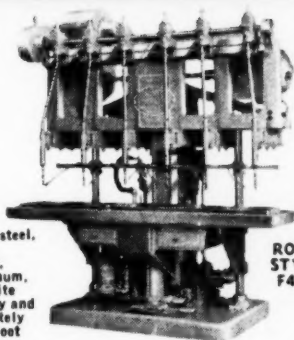
plete sets of extensions covering any dimension from $\frac{1}{4}$ " to $\frac{3}{8}$ ", thereby making the gage further useful as a tool-room instrument, for certain quality control uses, and as a general purpose gage.

The set consists of 27 centering size discs mounted on a rectangular plate with the size of each one plainly marked. The discs are interchangeable on the head locking into position by the action of a clamping nut, thus insuring that the set dimension will be held.

Other features of this No. 00 dial bore gage are the sapphire tipped gaging plungers and the hard chrome plated surface of the disc. Indicator graduations are .0001". While it is expected that the gage will be used to check very close tolerances, it will, however, cover a total tolerance as great as .005". The gage will check to within $\frac{1}{16}$ " from the bottom of the blind hole.

The manufacturer points out that the sets of discs are offered as an optional alternative to the user and that the gage will still be furnished, if desired, with a single disc suitable to the user's specified dimension and tolerance.

USE MULTI DRILLERS



Drill steel, iron, copper, aluminum, masonite quickly and accurately on a Root Multi-Drill.

ROOT
STYLE
F404

Power feed machinery with adjustable spindles allows many jobs to be handled on one machine. Send sketches of drilling jobs for free estimate.

B. M. ROOT CO. YORK, PA.

LAST WORD
WHEEL DRESSERS
Simplify the Job!

PRECISION ANGLE TANGENT TO RADIUS WHEEL DRESSING

- Dresses grinding wheel at point of contact.
- Shortens dressing time.
- Simplicity of setting.
- Rugged for long life.

Also Distributors of
SAMSON
OFFSET
BORING CHUCKS



Above: These and countless other forms may be dressed simply with the Last Word Wheel Dresser. Write for Catalog

LAST WORD SALES CO.

18500 MT. ELLIOTT • DETROIT 34, MICHIGAN

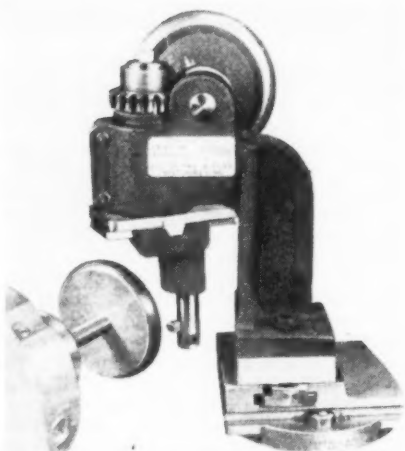
Versatile Concave, Convex Turning Tool

J. E. Freyman & Sons, Inc., Dept. BB, 3627-33 Keswick Rd., Baltimore 11, Md., claim that with their one tool an operator can do either concave or convex turning. The concave turning range of their No. 1 has from $5/16"$ to $2\frac{1}{8}"$ radius. For convex turning, the range is from $0"$ to $1\frac{1}{8}"$ radius. The tool bit holder is adjustable also.

The No. 2 is similar to the first, but with a concave range of $3/4"$ to $3\frac{1}{2}"$ radius and a convex range of from $1/2"$ to $2"$ radius. Longer radii can be turned by inverting the tool bit in the convex arm and rotating the spindle 180° . Both tools are rigidly built.

Their adaptability to large or small lathes is accomplished by varying the height of the spacer block under the tool.

Accurate setting of the tool bit for desired radius may be made by placing an adjustable parallel or gage block on the ground surface of the column, which has center distance stamped on

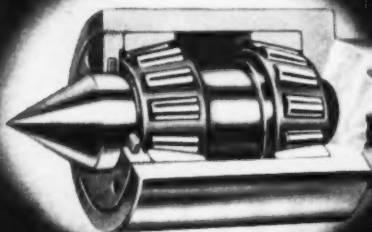


it, and adjust the sliding arm touching the tool bit to the gage block.

The adjustable sliding arm may be

...accurate beyond comparison

Falls ROTO CENTER



for
lathe and grinder
tail stocks



Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.

FREE BULLETIN 105

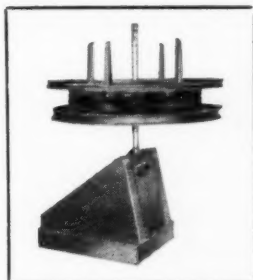
"What you should know about LIVE CENTERS"

FALLS PRODUCTS, INC., 122 Genoa Street, GENOA, ILL., U.S.A.

MOSLO "SHIFTWEIGHT" COUNTER-BALANCED WIRE REELS

Takes the Manual Labor out of loading a Reel with Wire. Just unlock the knurled spindle by a twist of the wrist, tilt the reel assembly 90°, roll coil of wire to reel, lift 6" on to centering arms, release lock by twist of wrist, use spindle as lever to lift, and the Weighted Counterbalance does the rest!

Capacity 300 lbs. — Min. Coil I.D. 10" —
Max. O.D. — 41" All welded steel construction — Brake Equipped.



Immediate Delivery
\$190.00 F.O.B. Cleveland
CLEVELAND 15, OHIO

MOSLO MACHINERY, INC.
2443 PROSPECT AVENUE •



**FOR FASTER
PRODUCTION!**

THE *unusual* **ELLIS** DIVIDING HEAD

"Versatile" is the word for the unusual Ellis Dividing Head. This beautifully designed and built unit can extend the profit and production possibilities of your mills, grinders, drill presses and jig borers. It has 6½" swing, or 11" swing when used with riser blocks. Its fully universal action provides every needed setting, so that most work can be completed without rehandling. Work may be held between centers, or in chucks or collets. Write for catalog giving complete details!

NICHOLS-MORRIS CORPORATION 76-G MAMARONECK AVE.
WHITE PLAINS, N. Y.

set to the desired radius or the tool bit may be reversed for concave turning. For adapting to other setups the sliding arm may be removed and reversed on the dovetail bar and the tool bit inserted in either side of the holder.

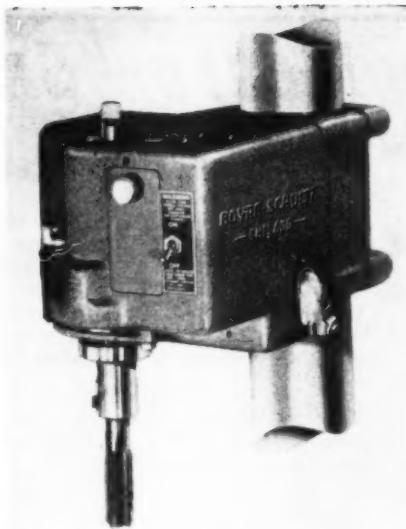
The tool may be clamped in the lathe as assembled, enabling the compound head to be used for spacing successive cuts, or may be turned 90° to the "T" slot, using longer screws directly into the "T" slot nut.

Lead screw tapping head

The Boyar-Schultz Corp., Dept. BB, 2108 W. Walnut St., Chicago 12, Ill., announces a new lead screw tapping head.

The manufacturer claims that with this unit it is possible to change an ordinary drill press into a precision tapping instrument in a matter of minutes. It will then produce any thread including class 4.

No special skill is said to be required for operation. A foot control switch leaves the hands free for loading work;



built-in reversing switch actuates drill press motor, eliminating the need for

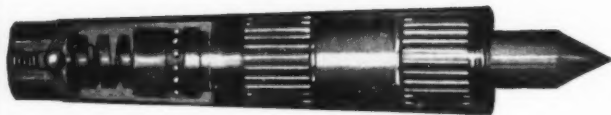
CONCENTRIC
SPRING LOADED

LIVE CENTER

**THE ORIGINAL
SPRING LOADED
LIVE CENTER**



**FASTER
SPEEDS**



**AUTOMATIC
THRUST
ADJUSTMENT**

Patent No. 2,520,473

**Operates 4 - 5 times faster than ordinary live centers.
Less overhang . . . means more rigidity, more working range.
Spring loaded spindle gives automatic tail stock adjustment.**

WRITE TODAY FOR COMPLETE INFORMATION!

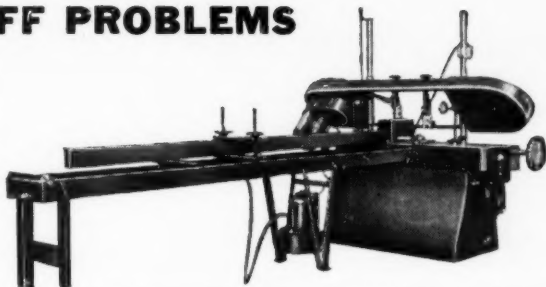
CONCENTRIC TOOL CORP.

2970 Huntington Drive
San Marino, California

SOLVE CUT-OFF PROBLEMS

You'll do a REAL job—faster and at lower cost—with these hydraulically controlled Model M or D units. Automatic bar feed (also shown), other accessories, and hinge-type metal saws available. Write today for details from the pioneers in this industry. . . .

W. F. WELLS & SONS
THREE RIVERS, MICH.



ACROMARK MAKES— THE ACROMARKER

Name Plate Stamping Machine in several models—
HAND—FOOT AND
POWER Operated.



For parts stamping and a variety of lettering and numbering jobs.

Write to the "ORIGINAL MARKING SPECIALISTS" for complete information upon a wide range of marking equipment.

THE ACROMARK CO.

15 MORRELL ST. ELIZABETH 4, NEW JERSEY

HAND TAPPING with MACHINE PRECISION

Adapts for
LATHE
USE

59⁵⁰

F. O. B.
FACTORY



Just slip a tap adapter into the Dahlstrom Tap Guide and twist. Your hand tapping will be quick and accurate. For machine tapping, the spindle top is center-bored to fit the tailstock center of a lathe. Size 13" x 8" x 14". Includes 9 adapters (8/32 to 1/4"). Taps not furnished. Branch Mfg. Co., North Branch, Minn.
WRITE FOR PAMPHLET.

Dahlstrom TAP GUIDE

POWER REAMING MACHINE

Will save many times its cost! Ideal for removing burrs after keyseating or tapping of set screw holes. Finish reaming speeded up with increased accuracy. Tedious hand reaming eliminated.

CATSKILL ABRASIVE CUT-OFF TOOL

A rugged, compact unit for constant production. Cuts accurately a wide range of materials—readily adjustable to cutting of all non-ferrous metals and plastic. Safety and accuracy assured.

JOSEPH E. MURPHY CO.

24 Ellsworth St. Worcester 3, Mass.



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ROLL FEEDS

PRECISION FEEDS FOR ALL TYPES OF PRESSES



**COMPLETE
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Now you can be sure of non-slip, accurately measured feeding (in thousandths) on your punch presses, either bench or pedestal types. Instantly reversed by merely shifting feed finger spring from one lug to the other! Original setting is maintained as there are no ratchets or pawls to wear. Plan to equip your presses with Roll Feeds. Write today for complete list and data.

**EARLY
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ON
STANDARD
MODELS**

ROLL FEEDS CORPORATION
Pawtucket Rhode Island
An Electrix Affiliate

any intermediate reversing device.

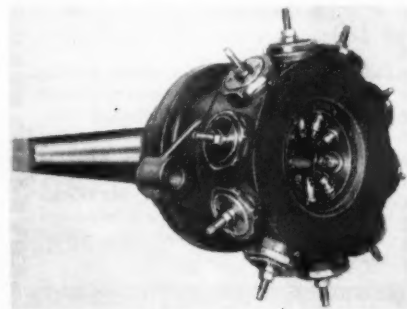
Taps up to $\frac{7}{8}$ " diameter are usable with standard adapter bushings. For taps from $\frac{15}{16}$ " to 2", adapters are available on special order.

Spline cutter can be used on drilling machines

This machine, recently developed by Earle G. Boyer, P.O. Box 4909, Dept. BB, Philadelphia 19, Penna., is a milling head for the milling of multiple splines, grooves or slots of all types in drive shafts, propeller shafts and miscellaneous items requiring multiple splines or grooves.

Various types or shapes of such operations can be milled economically, it is claimed, by changing the cutting tools, which may be adjusted to an accurate micrometer setting from the outside while tool is in operation.

Machined parts requiring a square or hexagon end milled on can be han-



dled on a production basis by changing position of cutter holders and cutters to meet requirements.

This unit can be operated in ordinary drill press, engine lathe or other shop tools; the head operates either forward or reverse, at any angle.

Splines or grooves can be milled either straight or spiral in either direction at either a maximum or minimum pitch.

Lower cost milling of small cams

The American Cam Company, Dept. BB, 15 Flower St., Hartford, Conn., announces the development of a machine

ALL in ONE TOOLHEAD



SIX SIZES
AVAILABLE

All Have Power Feed
for Facing

Write today for
complete details.

CHANDLER TOOL CO.
Muncie, Indiana

BORING
FACING
TURNING
GROOVING
UNDER-
CUTTING



Model "D"

COMBINED BORING & FACING TOOL HEADS
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Precision Built GEARS

SPUR
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SPLINES
BEVELS
RACKS
SECTORS
WORMS
HELICAL

$\frac{1}{4}$ " to 80" in Diameter
Metallic and Non-Metallic
Cutting only or Complete Gears

From a stock of over 8,000 Gears, Sprockets, Pulleys, V Belts and Roller Chain your requirements can be handled immediately. Whether you need one or a million Precision Built Gears your order will receive special attention.

Boring Mills to 80", Lathes to 55", Lucas Boring Mills $3\frac{3}{4}$ ", Radial Drills to 6 ft., Planers to 12', Grinders O.D. to 12" x 10 ft., and over 400 other Machine Tools to serve you.

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NAMEPLATE MARKING

MODEL
No. 4



The nameplate on your product is your signature; keeps it neat and legible! Accurate location and alignment are assured

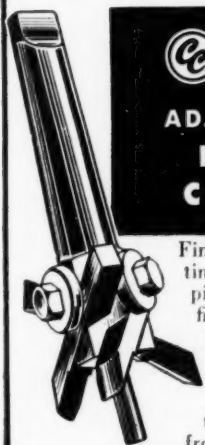
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ADJUSTABLE
HOLE
CUTTER

Finished cuts the first time in boiler plate, pipe, plastics, hard fibre, stainless steel, Transite, etc. 7 models cut variable expansions from $\frac{5}{8}$ " to 5" holes, with thickness capacities from thin sheets to 1".

For complete information call your Clark Cutter Jobber now or write Factory B

ROBERT H. CLARK COMPANY
9330 Santa Monica Blvd., Beverly Hills, Calif.

Manufacturers of Precision Cutting Tools

to increase its production of small cams and special contours at lower cost.

Designed especially for cams less than 3" in diameter, this new machine enables Amcam to cut production time on large quantities of small cams up to one third, they claim. The machine is

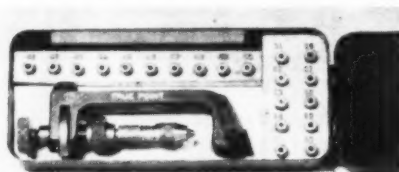


an adaptation of a standard cam milling machine. However, by being reduced to bench size it can be operated at much faster speeds with fingertip control and quicker changeover between pieces.

True Point drill sharpener

The drill sharpener made by the Up-to-Date Tool Co., B-5, P.O. Box Station A, Worcester 8, Mass., is claimed to be the only type of its kind in this country.

It is used to sharpen the drills by hand, without power driven machinery,



for number drills 41 to 80, without gaging; either right- or left-hand drills can be resharpened in a minimum amount of time, it is said.

For very small sizes, the HB-13 hard Arkansas stone is necessary for the unit, but for the larger ones fine India oil-stones are inserted.

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pass
inspection**

the new
lead screw
tapping
attachment used with
any
standard
reversing
head

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"Auto-tap"*

Automatic Methods INC.

PRECISION PARTS FOR THE AIRCRAFT INDUSTRY

Excellent for production tapping.
Write for illustrated literature
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Small and Medium

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D & M AUTOMATIC PRESS GUARD



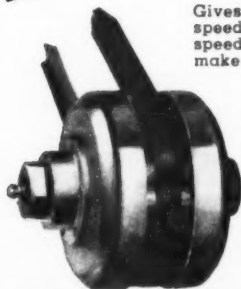
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Springs
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Fits Any
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• This punch press guard meets the most exacting standards of safety engineers and safety laws. Permits operator to feed the press without hindrance.

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Immediate Delivery

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Variable-Speed HI-LO PULLEY



Gives infinite variable speed with constant speed motors and any make of standard V-belt.

Maintains constant speed at any speed setting. Load carried by positive contact between cam and cam track, exclusive HI-LO feature.

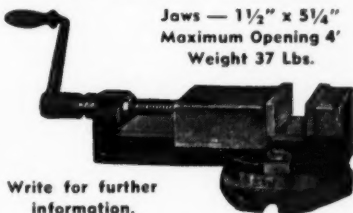
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MORE
INFORMATION

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ENGINEERING CO.**

2851 Columbus
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NEW BRITAIN

SWIVEL VISE



Jaws — 1½" x 5¼"
Maximum Opening 4"
Weight 37 Lbs.

Write for further
information.

The body is made of semi-steel; the jaws of tool steel hardened and ground. All working surfaces are ground. The vise is as accurate as is possible and the degrees are cut to very close limits.

NEW BRITAIN TOOL & MFG. CO.

13 HARVARD STREET
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**G&H
COLLET
TYPE**

INDEXING FIXTURES



Provide faster finishing of multi-machined precision parts. Quick acting for easy set-up and fast indexing on wide variety of machines. Easily mounted at any angle on millers, grinders, shapers, drill presses, etc. Index plates with 24 notches for any multiple of 15° - one plate can be used to give 2, 3, 4, 6, 8, 12 or 24 index positions per revolution. Special plates furnished for particularly complex jobs.

Write for full information

GUSTAFSON ENGINEERING CO.
327 ELM ST., FITCHBURG, MASS.

LINLEY noiseless RIVETING MACHINES

**Cut time and
cost in rivet
spinning**



These fast, sturdy, easily operated machines put your riveting on a production basis in terms of speed and low cost. We'll gladly demonstrate what they can do and the high quality of work they turn out. Send samples of your parts to be riveted and we'll give you time and cost estimates on handling your rivet spinning on a LINLEY.

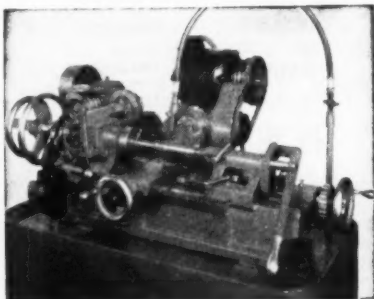
Sizes and types for iron and cold rolled steel rivets up to $\frac{3}{8}$ " - larger capacity for rivets of softer materials.

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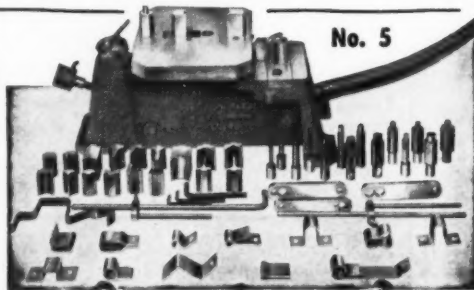


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Multiform BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models. The MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend and cut round or flat brass, bronze, aluminum, steel, etc., up to $\frac{3}{4}$ " x $1\frac{1}{2}$ " as illustrated, other models up to $\frac{3}{4}$ " x 4".

J. A. RICHARDS CO.
KALAMAZOO, MICH

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Thor adds Copper Line drill

A new Thor 1/4" Copper Line electric drill, featuring pistol grip operation, has been announced by the manufacturer, Thor Power Tool Co., Dept. BB, Claim St., Aurora, Ill.

This low-priced addition to the Thor power tool line is small, lightweight and streamlined for fast, easy operation, yet powerful and sturdily built



for long, rugged use. It weighs 2 3/4 lbs., and measures only 7 7/8" in length.

The handle and field case are cast in one piece for added strength; separate cover for switch mounting, and ample hand grip for comfortable handling of drill. The switch is momentary type, with trigger lockpin for continuous operation. Baffle plate construction, plus centrifugal fan, assures cool operation.

The drill is furnished with either geared chuck or keyless chuck as specified. A convenient boss is provided on gear case behind chuck for mounting in drill stand.

Shold-A-Grip bushings, sprockets

The Boston Gear Works, 14 Hayward St., Dept. BB, Quincy, Mass., has announced a new interchangeable split tapered bushing, designed principally for use with sprockets.

This new bushing is said to make possible the use of the same size Boston sprockets on shafts from 1/2" to 2 1/2" in diameter in steps of 1/16 of an inch. This eliminates the need to rebore

SPECIFY KASSON PRECISION COLLETS AND ATTACHMENTS

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KLUTCH-KOLLET

Step collet for accurate chucking to 2 3/4" dia. Soft head for easy boring. Lowest price on market! Models 3AT, 3C, 5C.

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HAND DRAWBAR 1/2" cap.

LIVE CENTER (Ball Bearing) Double sealed for accuracy.



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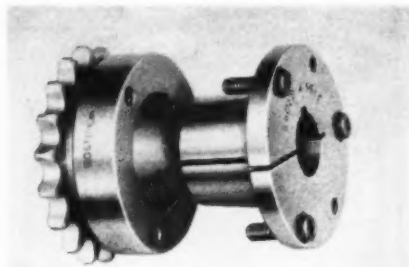
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ACME TOOL CO.

71 W. Broadway, New York 7, N. Y.

stock sprockets to fit particular shafts, thus saving the time and cost of re-boring, keyseating and tapping for set-screw.

The Shold-A-Grip bushing is drawn into the tapered hole in the sprocket by tightening cap screws. As both the i.d. and the o.d. of the bushing and the bore of the sprocket are ground, the bushing grips both the sprocket and



the shaft with the equivalent of a press fit—even on shafts which are undersized as much as .005".

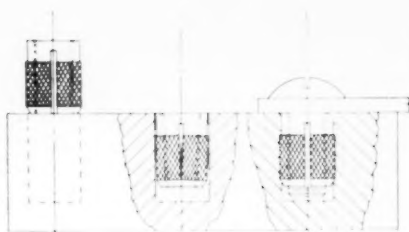
The mating Shold-A-Grip sprockets have a shoulder on the hub, allowing room between the teeth and the shoulder for chain clearance. Because the bushing is screwed to the shoulder, and because the diameter of the shoulder is not limited by chain clearance, the sprocket can be manufactured with a maximum size bore and minimum number of teeth.

Shold-A-Grip sprockets are available from stock in sizes from 1/2" pitch up to and including 1 1/4" pitch.

Screw locking insert

A new design has been added to the line of brush screw locking inserts (devices for providing threads in blind holes in all kinds of materials) made by Brush Nail Expansion Bolt Co., Dept. BB, Greenwich, Conn.

The new number is known as a knurled insert. The three-stage principle of operation is shown in the accompanying sections; it is the principle common to Brush inserts. The new item is distinguished by a large band of diamond knurling on its grip area.



This knurling is said to make for very superior contact when used in hard and dense materials, such as molded plastics or metal castings, and also provides high resistance to torque.

Since they are simply pushed into plain round holes, these inserts eliminate the many difficulties of molding-in inserts. Besides locking the screw they require no special tools and there is no quicker way to provide screw threads for blind fastening in all kinds of materials.

Standard knurled inserts are made of aluminum, but are available in other materials and in a range of sizes to accept screws from 4-40 to 1/4-20.

Small capacity oiler

The Oil-Rite Corp., manufacturers of industrial lubricating equipment, 2374 Waldo Blvd., Manitowoc, Wis., has announced a new line of wick feed oilers.

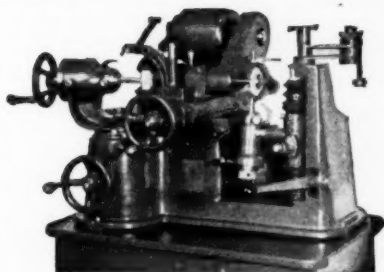
These are brass-bodied, simple, sturdy and dustproof. Filtered oil is



fed and dirt cannot reach or injure bearings. These oilers are especially suitable for use in dusty surroundings on all classes of machinery.

Oil in the body is carried through the wick over the standpipe to the bearing by capillary action, assisted by a syphon effect. Oil of light or medium body should be used, as the oil must remain fluid enough at the temperature

HYBCO TAP GRINDER



MODEL 1100

CHAMFER
Sharpening



FLUTE
Sharpening



GUN POINT
Sharpening



- Capacities No. 0 Machine Screw to 1 1/2" Hand Taps.

HENRY P. BOGGIS & CO.
710 East 163rd Street
Cleveland 10, Ohio

used to feed by capillary action.

One-piece hexagonal brass bodies and knurled brass screw tops are machined from solid bar stock. The wicks are inserted into and around the standpipe and can be easily replaced or removed for stopping the oil flow.

Soldering flux in dispenser

A soldering flux, known as Tri-Flux, being manufactured by Wolfe-Kote Co., Dept. BB, 1225 N. 8th St., Sheboygan, Wis., is now being put up in handy dispenser bottles that are said to be unbreakable and refillable, and to dispense without waste or use of brushes.

The flux is a liquid aqueous flux, of which there are several different formulations suitable for use in solder-



ing steel, stainless steel, copper, brass, zinc and tin, with either an iron or torch.

Said to be triple acting, its use eliminates the need of precleaning the metal with solvent and acid to remove oil and rust. It is noninflammable and doesn't produce unpleasant odors.

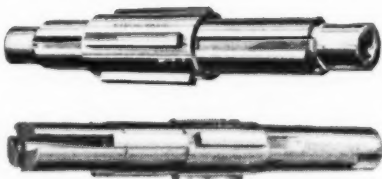
Handle-type thermometer

A new idea in heat measurement is the Dillon handle-type thermometer. It is made by W. C. Dillon & Co., Dept. BB, 14620 Keswick St., Van Nuys, Calif.

In many applications thermometers cannot be screwed in position, but must be held by hand. Ambient or transmitted heat is often too great for the operator to bear. With this new instrument, a comfortable hand grip is provided on opposite sides of the dial. Thus, it can be plunged directly into hot asphalt, foundry sand, chemical mixtures, etc., without burning the operator. The handle is curved to fit

Nicholson Expanding Mandrels → **SAVE TIME LOST** Providing Solid Arbors

Records in many shops show Nicholson expanding mandrels actually get operations completed in less time than was formerly consumed in providing solid arbors. In cases this results in a tremendous cut in "down" time. Set of 14 Nicholson mandrels replaces 209 solid arbors. For all bores $\frac{1}{2}$ " to 7"; sold singly or in sets.



For details send for **BULLETIN 750**
117 Oregon St., Wilkes-Barre, Pa.

W. H.

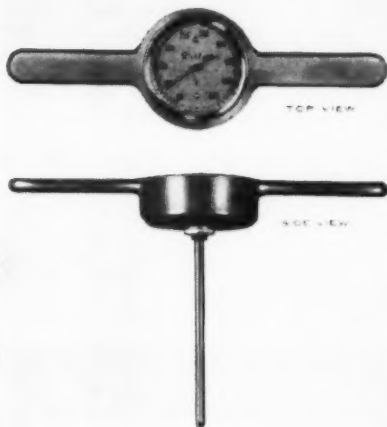
NICHOLSON

& CO.

TRAPS · VALVES · FLOATS

the palm of the hand and also acts as an additional protection for the thermometer, since it completely encases the edge and underneath portion.

The Dillon thermometer is available in dial diameters of 4-3/4", 2-13/16", or 2-1/4" and can be ordered in stem lengths up to 72", if desired. The thermometer proper is of acid-resistant stainless steel, and the handle (which



can be easily unscrewed if the occasion demands) is of cast aluminum with hammered enamel finish.

Ranges offered for the new instrument are numerous and cover all popular requirements in either Fahrenheit or Centigrade. Special ranges can be made to order. Tempered glass crystals are standard, but plastic crystals are optional.

Pneumatic remote control for Varidrive motors

Variations in speed of U. S. Varidrive motors by pneumatic remote control are now possible through a recent development of U. S. Electrical Motors Inc., 200 E. Slauson Ave., Dept. BB, Los Angeles 54, Calif. This control consists of a positioning unit, an air-operated plunger attached to the Varidrive speed-changing device and an air valve which remotely controls the

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ABENE

**PRECISION MADE
IN SWEDEN**

VERNIER HEIGHT GAGE

• Direct readings in
.001" from sur-
face plate to zero.

Easily adjustable
to compensate for
wear.

Supplied in wooden
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| 0-12" | \$ 67.50 |
| 0-18" | 140.00 |
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Absolute
Accuracy
Guaranteed



One of the finest and sturdiest height gauges made, the ABENE is the ideal instrument for measuring and scribing off vertical distances, etc., and indispensable in making jigs and fixtures. All parts subject to wear are hardened, including height scale.

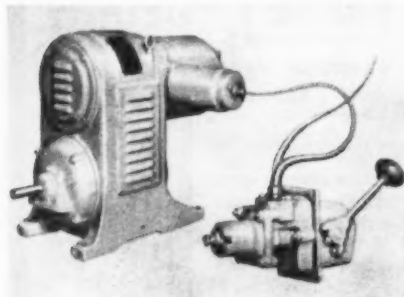
0-12" DIMENSIONS

Measuring range 0-12"
Length of scribing needle ... 2 5/8"
Size of foot plate 3 3/4"x2 1/2"x1 1/2"
Net weight 3 1/2 lbs. Gross weight 5 3/4 lbs.

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136 Lafayette St. New York 13, N.Y.
Telephone: WA lker 5-4048

positioning unit. Four types of valves are available, depending upon the method desired to operate the mechanism—pedal, lever, cam or wheel. The positioning units are designed to oper-



ate with an air pressure of either 60 or 100 p.s.i.

Through the use of check valves and control station selectors in the system, the speed of the Varidrive can be changed from any number of control stations. Conversely, any number of

Varidrives may be controlled by one station, providing they are to operate at the same speeds. If desired, the pneumatic control may be used to provide speed changes from one preset finite speed to another by one quick movement.

Precision surface grinder

The George Scherr Co., Inc., 200 Lafayette St., Dept. BB, New York, 12, N. Y., announces its new precision surface grinder, with vertical spindle and cup wheel. Savings in time for grinding flat surfaces of steel, cast iron and other materials are claimed.

There is a hand feed for rapid work and a power feed for fine precision finish.

Specifications are: capacity, $5\frac{1}{2}$ " x $13\frac{1}{2}$ ", $4\frac{1}{4}$ " x 15"; permanent magnetic chuck, $14\frac{1}{2}$ " x 6"; greatest distance between wheel and table, 11"; greatest distance between magnetic chuck and wheel, $8\frac{1}{4}$ "; motor, $1\frac{1}{2}$ h.p., 220 v., 60 cycle, 3 phase.

Standard accessories: wet grinding

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For Tools and Small Parts

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THE COOLEY BENCH MODEL RECIRCULATING AIR DRAW

| Max. Temp. | Sizes | Price |
|------------|----------------------------------|----------------------|
| 1250° | 10" x 6" x 14" 12" x 8" x 18" | \$475 to \$665 |

All prices are less controls. Any standard controls available for automatic temperature control.

1. IDEAL FOR

- aluminum and beryllium copper heat treating.
- closely controlled mild and high-speed steel tempering.

2. Stainless steel lined chamber.

3. Accommodates from 50 to 100 lbs. of parts.

4. Holds temperature uniformity $\pm 5^{\circ}$ - 0° F.

5. 4 and 6.5 kw. input at 230 v. assures rapid heating.

Controlling Pyrometers carried in stock — available for all applications.

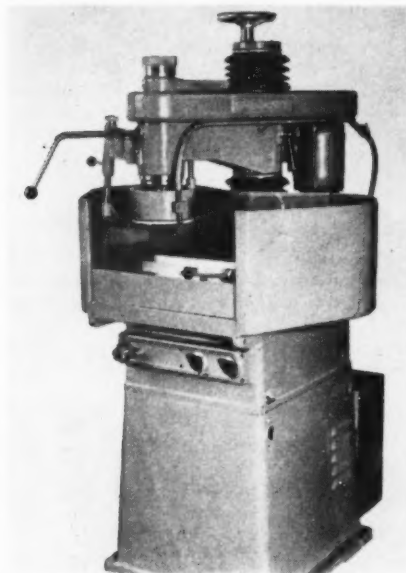
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COOLEY

ELECTRIC MANUFACTURING CORP.
36 SO. SHELBY • INDIANAPOLIS, IND.

attachment, wheel truing device, swivel joint lamp, spare wheel flange, flange with balanced weights, cup wheel, wrenches, screw driver, wrench for grinding wheel, and grease gun. Weight of machine is 1,584 lbs.

Vertical adjustment of the spindle is by means of a large hand wheel. The fine adjustment is by the large di-



ameter graduated drum reading in .0004". The machine uses 7½" diameter standard Norton cup wheels. A diamond dresser is attached directly to the wheel housing so that it is instantly available for dressing the wheel. The machine comes equipped with pump and piping for wet grinding.

Closed flame, dual fuel, gas-oil burner

A new closed flame, dual fuel, gas-oil burner, featuring increased burning efficiency and simplified installation and servicing, is announced by Eclipse Fuel Eng. Co., Dept. BB, Rockford, Ill. This new sealed, blast burner may be used with any gas or oil fuel for firing industrial furnaces, ovens and process

PRODUCTION BORING

with

E-Z SET

*by
Maxwell*



Only the MAXWELL E-Z Set boring tools feature high speed operation, micrometer-like adjustment to 0.0001-inch and maximum boring range.

Interchangeable shanks permit E-Z Set boring tools to be used in turret lathe, jig-bore, milling machine, boring mill, automatic or other machine tools. Because they can be adjusted for cut in only one-tenth the time formerly required by similar tools, these Maxwell-made tools can meet high-speed production on schedules.

E-Z Set boring tools are available in three models having maximum boring bar capacities of ½, 1 and 1½ inches and covering a boring range of from ⅜ to 20 inches.

Write today for catalog.



396-MC

THE MAXWELL COMPANY

220 Broadway • Bedford, Ohio

Economy

TOOLS KEEP YOU AT TOP PRODUCTION WITH MINIMUM COST



Your job can be no better than the tools applied in the making. You'll find that ECONOMY'S close-tolerance drill-jig bushings and gages meet your exact specifications and high production standards. Write for bulletin and price list on all A.S.A. standard types and sizes, as well as new gages and gages salvaged by hard chromium plating.

Economy

TOOL & MACHINE CO.

1829 S. 68TH ST., MILWAUKEE 14, WIS.

equipment in the operating range between 200° F. and 2400° F.

Outstanding features said to be excellent flame-retention and mixing qualities for gas, and increased atomizing efficiency for oil. A unique nozzle-mixing principle employs a new dual atomizing oil tip. Secondary air meets the gas or oil mixture in both a converging and rotating pattern, promoting atomizing efficiency at the nozzle exit.

A rotating, main-combustion air casting permits adjustments for any desired alignment of piping. The burner has a high discharge capacity and low turn-down range. Blocks are interchangeable with those of conventional burners.

Shovel truck

A shovel truck, for fast pick-up and easy-wheeling moving barrels, hampers or cases—in factory, warehouse, dock, etc.—is being manufactured by Palmer-Shile Company, 16021 Fullerton, Detroit 27, Mich., manufacturers of materials handling equipment.

Of all-welded construction, the heavy



steel nose plate is 19" wide at base tapering to 13" at front. The especially designed handle is made of heavy 1½" o.d. tubing. Complete with two 6" diameter wheels. Weight of truck is approximately 50 lbs.

No Leveling Required with

Anderson BALANCING WAYS

With Anderson Balancing Ways it is easy to balance any rotating object in a fraction of the time formerly required by other methods. Simply place the Ways on the floor or bench and they are ready to use without adjustments of any kind.

The revolving, chilled iron discs and the spindles are ground and balanced to extreme accuracy. Spindle bushings are hardened — glass hard — yet without danger of breaking. This eliminates the possibility of wear or ball bearing indentations on spindles or bushings when heavy weights are placed on the ways. They save time, save labor, and assure better work.



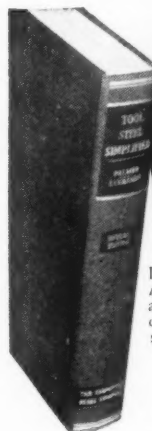
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ANDERSON BROS. MFG. CO., Rockford, Ill.

Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses.



| Swing | Between Standards | Capacity in lbs. |
|--------|-------------------|------------------|
| 20 in. | 20 in. | 1,000 |
| 40 in. | 30 in. | 2,000 |
| 60 in. | 30 in. | 2,000 |
| 72 in. | 66 in. | 5,000 |
| 96 in. | 88 in. | 10,000 |



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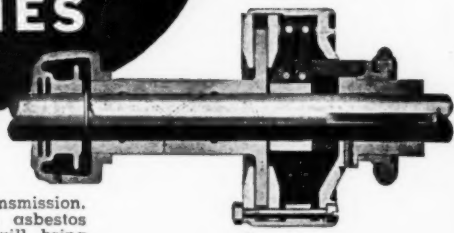
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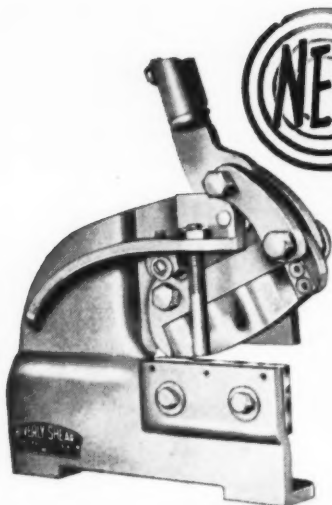
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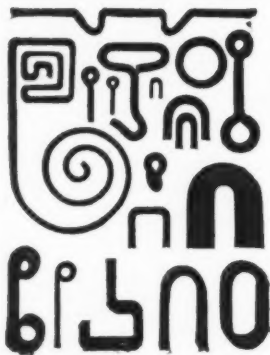
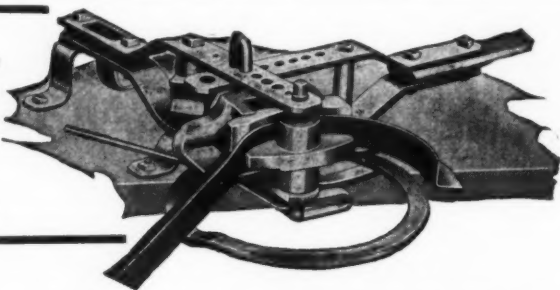
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Suitable for use on practically all surfaces—inside or outside—in factories, garages, laundries, engine rooms, washrooms, showrooms, offices, etc., the penetrating synthetic resin base makes it a good paint for concrete. It seals and colors wood, brick, composition and other surfaces. It comes in red, gray, brown, green and clear.

Versatile new hard-facing alloy

Superior resistance to abrasion at high temperatures, the ability to withstand attack by molten copper and improved welding characteristics are some of the important advantages claimed for CM-119, a new hard-facing alloy manufactured by Coast Metals, Inc., Dept. BB, Little Ferry, N. J.

Because of its ability to resist abrasion

A large, stylized graphic of a vise is the central element. The word "SAVE" is written in large, bold, white letters on a dark, curved background at the top. Below it, in white text on a dark background, is "ON PRODUCTION TOOLING COSTS WITH CARDINAL SPEED VISE". At the bottom of the graphic, it says "A HUNDRED JIGS IN ONE!". To the right of the text, there is a small, detailed illustration of the SPEED VISE holding a drill bit. The entire graphic is set against a dark background.

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Model R-40, showing part in Jig ready for Bushings. Three sizes stocked for handling round stock. Eliminates unnecessary delays in tooling and production.

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at the temperature of hot-rolled steel, CM-119 has already found successful application as hard-facing for large guide rolls, as hot friction guides and for soaking tong bits. Its resistance to attack by molten copper is a protection for the lips of copper converters.

CM-119 can be applied with any good arc-welding process. It will weld over itself and more ferrous materials without cracking, checking or porosity—a fact which permits patching where previously full replacement has been necessary.

Coolant system reclaims diamond dust

Shelboerg Mfg. Co., Dept. BB, 29 Ridgeview Drive, Indianapolis, Ind., has announced a dual-purpose machine, which will be known as Vap-Air exhaust. The company claims that this machine will enable users to make from 60 to 75% savings in their diamond grinding costs.

The Vap-Air exhaust first supplies an accurately controlled flow of cool-



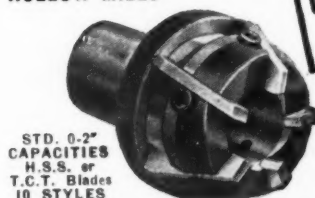
ant to the center of the wheel. All excess coolant is immediately sucked into a hood which is adjusted to the required position.

An auxiliary spray built into the hood keeps exhaust hose and fan flushed clean. A collector pan is located on the bottom for collecting the sludge from which the diamond dust can be reclaimed.

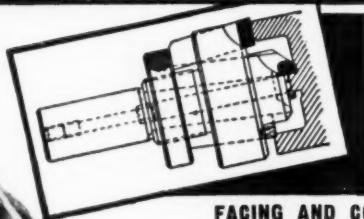
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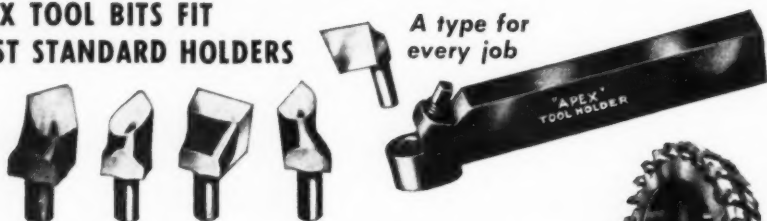
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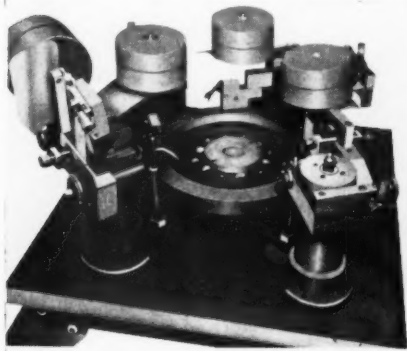
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This grinder, made by Spike Mfg. Co., 24609 Middlebelt Rd., Dept. BB, Farmington, Mich., for production grinding of solid carbide blanks, is said to produce a finish of 1 to 2.5 r.m.s. and gage block flatness, using a 150 grit diamond



wheel, holding dimensions to $\pm .0002$.

Due to a patented process, the wheel can be dressed and trued to .0005 in a few minutes. Longer wheel life is assured, reducing diamond cost from 20% to 50% per unit. Diamond salvage is less than 1 carat per lb. of sludge.

This unique yet simplified operation eliminates complicated controls and specially skilled labor.

Time totalizer

The R. W. Cramer Co., Dept. BB, Centerbrook 5, Conn., is announcing a new addition to its line of synchronous motors and precision timing devices. The type ET Time Totalizer is used to measure and to indicate elapsed time intervals wherever very precise measurement of time is required.

Two models are available: One has scale divisions of 0.01 second and a total range of 60 seconds, and the other has divisions of 0.01 minute and a total range of 60 minutes. Accuracy for either is said to be better than 0.02 of 1%.

A feature of the Time Totalizer is a differential clutch mechanism said to insure high accuracy and positive clutching throughout the life of the device. Instead of the conventional friction



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or face plate clutch, the motor is here permanently connected to the sun gear of a differential gear system. One of the differential members is connected to the pointer system, while the other goes to a free gear.

When the timer is energized, a solenoid-operated pawl stops the free differential member, and power is immediately transferred to the pointer differential member. When the timer is de-energized, a pawl engages the pointer gear, stopping it instantly, while the free differential member is simultaneously released, thus allowing it to rotate free. This arrangement insures positive, accurate clutching without slippage.

Improved flux reported for use in silver brazing

An improved, all-purpose version of its "1200" flux compound is announced by The American Platinum Works, Dept. BB, Newark 5, N. J., for use in silver brazing operations.

The product, which retains the same "1200" brand name, is designed for universal application with silver solders in the brazing of ferrous and non-ferrous metals. It may be used on all metals "at all temperatures common to silver brazing."

Consisting of a mixture of fluoride and borate salts, the flux melts at a temperature lower than the alloys employed and forms a coating of fused salts over the brazing area. It performs three functions: covers the work and the brazing alloy, preventing oxidation of the surface during heating, brazing and cooling; cleans and floats off dirt or oxides; and reduces surface tension of the molten alloy, causing it to flow freely over work surfaces that have been heated to brazing temperature. A smooth paste, it is easily removed after brazing by washing with water, the firm states.

The flux is in one-half-pound, one-pound and five-pound jars, thirty-pound containers and sixty-five-pound pails.

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Saw blade welder

A larger capacity portable band saw blade welder has been announced by Brennen Mfg. Co., Dept. BB, 676 59th Street, Brooklyn 20, N.Y. Designed to butt weld all blades from 1/16" to 3/4", it permits a wide range of work from intricate internal tool and die to power cutoff saws.

Compact and fully automatic, the

welder is claimed to be an all purpose unit that will handle practically all requirements of the band saw user. There is a built in grinder, designed to remove flash from the weld, and a double gage for checking thickness of weld on flat saws. Welding jaws are constructed of solid copper and the unit is housed in a welded steel case. All-over dimensions are 7 3/4"x12"x7". Weight is 31 lbs.

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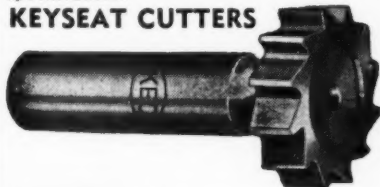
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The battle to keep down costs is going well for producers of stampings. Coil stock and modern coil handling equipment are the decisive factors. Coil stock, with only two scrap ends to its entire length is far more economical than strips of straight stock with two scrap ends to every ten feet. Moreover, the type of coil loading and handling equipment built by F. J. Littell Machine Co. makes coil stock easier to handle than straight stock. Stamping producers are taking full advantage of these developments. Coil stock and Littell Coil Hooks, Reels, Straightening Machines and Automatic Roll Feeds are in wider use today than ever before.

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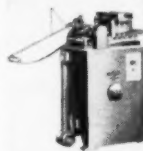
Littell Hooks make it a simple matter to unload coils on delivery, and to load reels. The variety of sizes have lifting capacities from 1,000 to 40,000 pounds.

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Littell Coil Cradle Reels mount heavy coils, up to 40,000 pounds. Spindle Reels handle coils up to 10,000 pounds. Each type is available in plain or motor driven designs.

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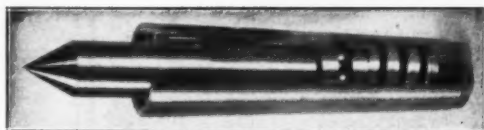
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- No Scored Centers
- Remarkable Accuracy



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IN 11 SIZES—No. 6 to 1"
N.C. In all S.A.E. sizes.

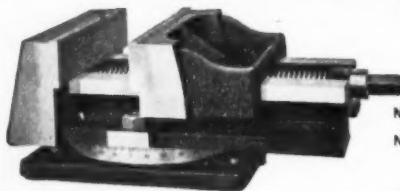
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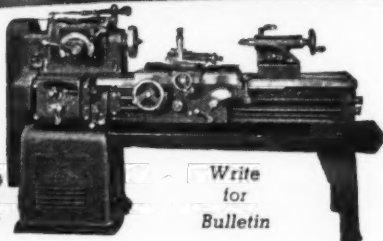
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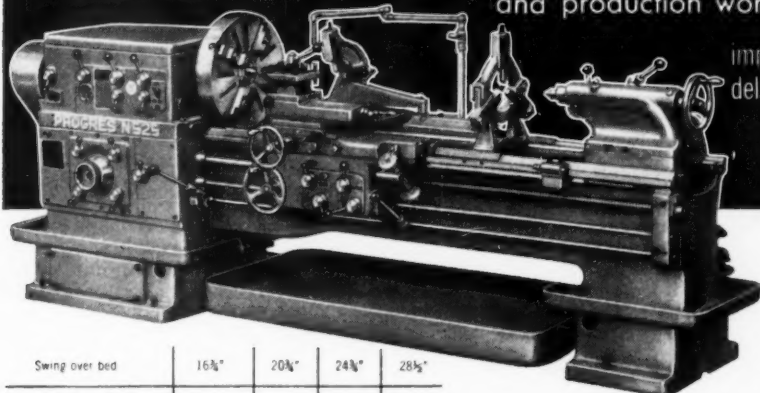
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PROGRES lathes for tool room and production work

immediate
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|----------------------|--------------------|--------------------|--------------------|--------------------|
| Swing over bed | 16 $\frac{1}{2}$ " | 20 $\frac{1}{4}$ " | 24 $\frac{1}{4}$ " | 28 $\frac{1}{2}$ " |
| Spindle speeds r p m | 11 to 1,000 | 10 to 910 | 8 to 710 | 8 to 710 |

Over 100 put in operation in the U. S. A. last year.

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Parker Machine Company, Inc.

158 PIONEER ST., BROOKLYN 31, NEW YORK - TRIANGLE 5-2103 and 2157

Machinists' chests

Salem Industries, Dept. BB, North Salem, N.H., announces new features for their line of quartered-oak ma-



chinitists' tool chests.

Some of the features include: frame and body of thoroughly seasoned, kiln-dried oak; cabinetmaker's joints cemented and reinforced with screws and

steel pins throughout; finish, dark oak, alcohol acid resistant; drawers, 3 ply birch bottoms lined with felt; nicked trimmings; automatic locking device—one lock closes entire case; till is felt-lined with mirror and lid supported by plated chain.

Set screw for increased holding power

An entirely new type of set screw, under the name "Nu-Cup," is announced by Set Screw & Mfg. Co., 36 Main St., Bartlett, Ill.

The cup point of the "Nu-Cup" Set Screw is so designed that the user is said to be able to obtain greatly increased holding power with the same amount of setting torque. The diameter of the cup circle is larger than that of the standard cup point. This makes possible a fuller contact and a deeper impression into the shaft, offering greater resistance to reversal, with the same setting torque.

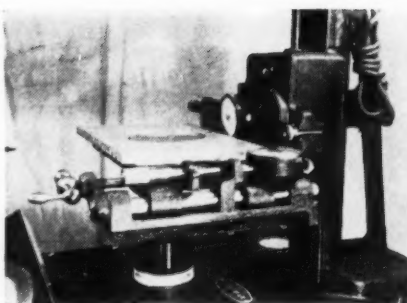
"Nu-Cup" Set Screws are particularly suited to applications in which

the shaft is soft, or is small in relation to the contact arc of the screw cup. The new set screws are made of an alloy steel; they are available in slotted headless and slabbed type set screws only.

Coordinate stage for optical comparator

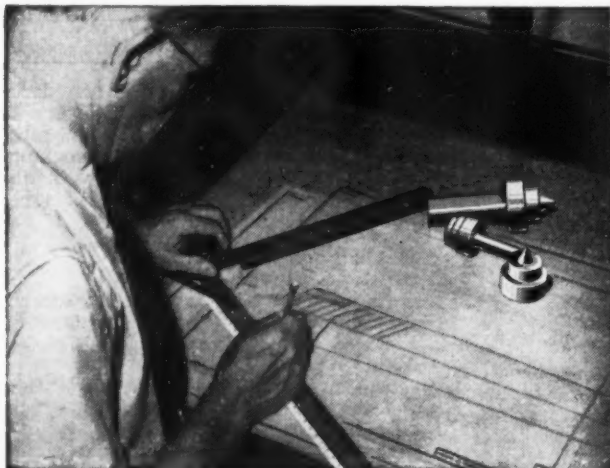
A universal type coordinate stage designed for use on the Model C-100 Portman optical comparator has just been announced by the Portman Instrument Co., Inc., Dept. BB, 6 Manhasset Ave., Port Washington, N.Y.

This coordinate stage is equipped with independent measuring controls consisting of a combination of two dial indicators and two micrometer spindles for both longitudinal and transverse travel measurements. Travel of a full $1\frac{1}{2}$ " longitudinally and 1" transverse is possible with this new stage, and in addition the entire stage unit is adjustable for helix angle positioning to 10° either side of center. The entire



stage assembly also incorporates a "swingaway" feature, facilitating the changeover of lens units from one magnification to another without disturbing any work setups on the stage.

The stage working platform area measures 6" in width by $9\frac{1}{4}$ " in overall length and is equipped with a 4" diameter removable glass stage insert disk for the convenient location of parts to be inspected.



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...A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job is set up with the right Live Center. Standard shanks with Morse taper carried in stock.

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Die Forge, Plastics Machines Developed

Simultaneous development of a die forge casting machine (top) and a plastics injection molding machine (bottom) has been announced by Lewis Welding & Eng. Corp., Dept. BB, Bedford, Ohio.

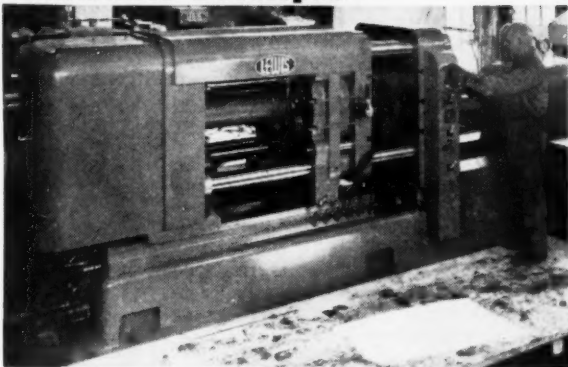
Both machines are said to incorporate a basically new principle of clamping the dies or molds, the "Hydra-Lock." In most respects, the machines are similar. The chief difference is that the die casting machine injects molten metal into a die and the plastics injection molding machine takes a granular synthetic resin, heats it to plastic consistency, and injects it into a mold.

The die forge casting machine employs 100,000 lbs. of pressure to produce bronze, aluminum and magnesium die castings with minimum porosity and increased density and tensile strength.

It is expected that the die forge casting machine, which weighs 29,000 pounds, will find wide acceptance in the mass production industries, including automotive, avia-

tion, appliance and electrical.

The plastics injection molding machine



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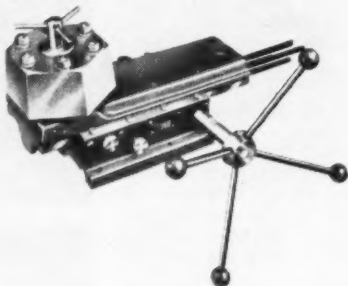
is expected to find a large market in the toy, container, novelty, automotive, radio-television, electrical and mechanical small parts industries. This machine weighs 82,000 pounds and will produce such difficult to mold products as plastic wall tile.

While these machines are used in widely divergent fields, both have the "Hydra-Lock," which in essence is a powerful hydraulic vise which holds together the two halves of the dies or molds with a final clamping pressure of 650 tons in the case of the die casting machine and 200 tons in the case of the plastics machine.

Tilt-Head bed turret announced

A. K. Tool Co., Dept. BB, Los Angeles 39, Calif., manufacturers of Newton precision bed turrets, announces the new tilt head design that is said to enable the operator to swing tools as large as 6" in diameter over the ram, also giving working travel of 7¼".

The self indexing bed turret has ground bearing surfaces on the slide and bed plus selective fitting of key parts. Repeated accuracy is claimed through a new type tapered locating pin which works in a sleeve bearing



and locates in a mating seat. All parts are made of tool steel heat-treated to tool bit hardness, ground and honed. It is designed for most 10", 11" and 12" lathes.

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carries the
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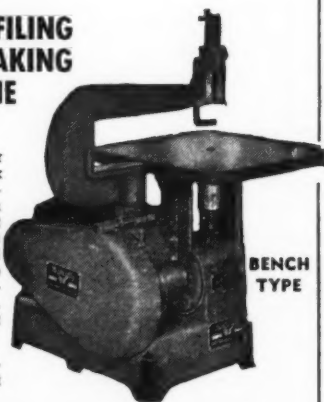
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This is a powerful machine for heavy or small precision work in use all over the world: Airplane Factories, Ammunition Plants, Toolrooms where fast production is desired. 4 Models No. 16, No. 14, "EL" and Model "D". The larger the model, the larger the stroke and therefore more filing is performed. Furnished with or without pedestals.

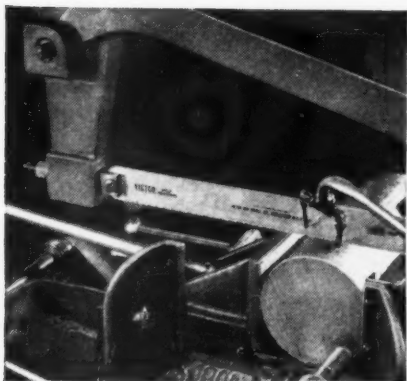
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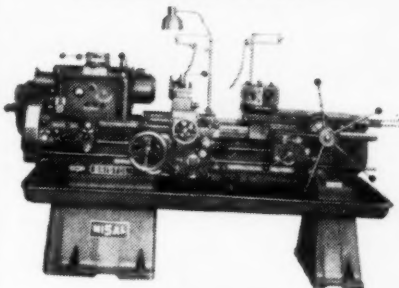
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TURRET
LATHE No. 4



SPECIFICATIONS:

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|---|-------------------|
| Round collet capacity | 2" |
| Swing-over bed | 16" |
| Bed width | 12½" |
| 12 spindle speeds | 21 to 1500 r.p.m. |
| 4 turret feeds and 6 cross slide carriage feeds | |
| Screw cutting capacity | 1½" |
| Tool holes in hexagon turret | 5 |
| Motors, H.P. | 5 |
| Net weight, lbs. | 4195 |

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\$9300

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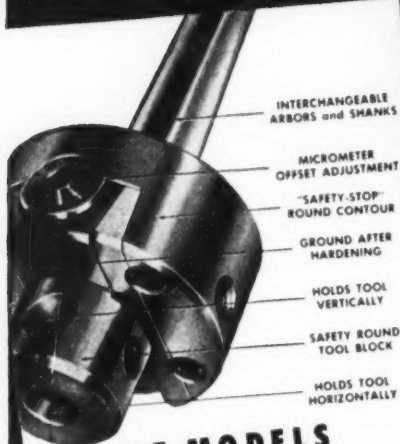
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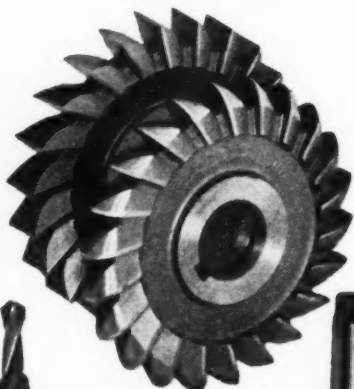
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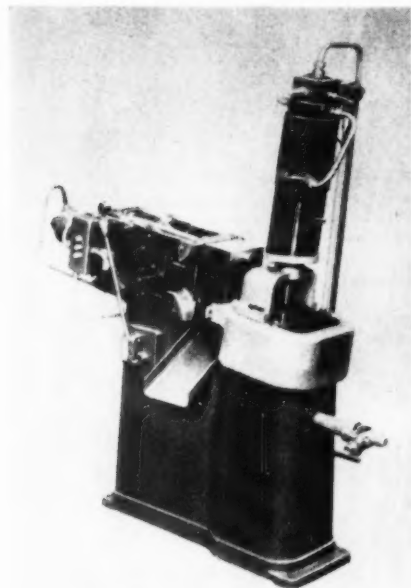
TW inbrook 3-6240

DCMT Model IMP/96 1 lb. die casting machine

High speed, high pressure injection is featured on the latest model 1 lb. zinc alloy die casting machine, offered by DCMT Sales Corp., 164 Duane Street, Dept. BB, New York 13, N. Y.

The IMP/96 machine contains an injection system of the impact type, whereby the piston area for injection is much larger than the area for piston return. This results in high-speed injection with no cushioning effect from the air trapped underneath the piston.

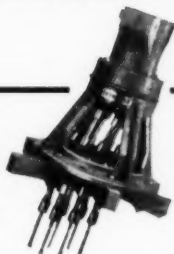
In order to secure the greatest advantages from this type of injection, the



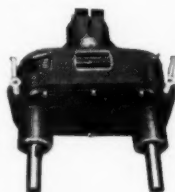
main valve is a pilot-operated type, so that no throttling effect is undergone by the air going into the injection cylinder.

All of the basic advantages of DCMT diecasters, such as fast chilling, high cycling and automatic ejection of finished parts, have been retained in this machine, so that production runs of 800 to 1000 shots per hour are claimed. One of the features of the machine is that

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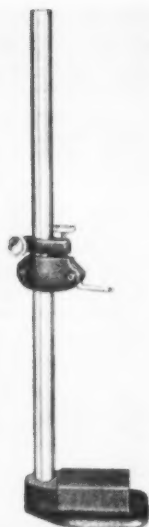
Also Makers of
DORMAN AUTOMATIC REVERSE TAPPERS

it is designed to use small prefabricated die blocks, which are completely machined, except for the cavity itself. The use of these die blocks enables manufacturers to use single cavity dies for their small parts, resulting in great savings in die costs.

Weighing only 470 lbs. and taking up only 12" x 36" of floor space, the IMP/96 is a high-speed production machine applicable to a wide range of products, including hardware, toys, appliance parts, jewelry, novelties, etc.

Dickerman height gage

Recently introduced by the H. E. Dickerman Mfg. Co., Dept. BB, 321 Albany St., Springfield, Mass., and supplementing its regular models, is a new height gage. Incorporating design features which make it quickly adaptable for use as a height gage, comparator or scriber, this new gage is available in column lengths of 18" and 24". Greater post diameter and flanged base



contribute to accuracy and stability in sustained gaging, inspection, or quality control operations.

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machines today



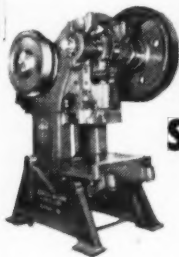
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will handle mild steel up to 10 gauge, with less curl and burring . . . cannot be overloaded.



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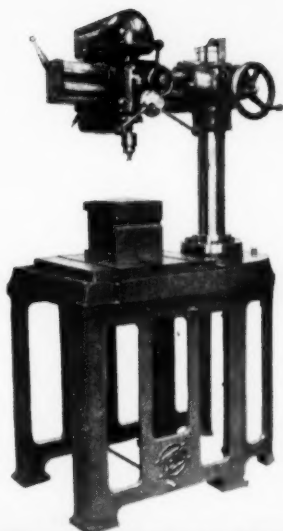
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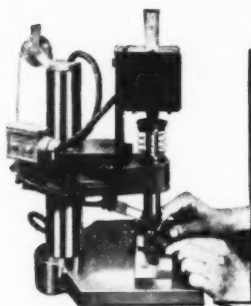
OFFICES IN PRINCIPAL INDUSTRIAL CENTERS

Wall Trig-R-Heat instant soldering iron

Wall Mfg. Co., Dept. BB, Grove City, Pa., has introduced a new instant heat gun type of soldering iron that doesn't use a transformer. The company claims it makes soldering more accurate, more economical and more efficient for home hobbyists, maintenance men and servicemen of all types.

The iron has a light, plastic gun grip. Heat is quick, reaching working tem-





- Presses parts together — then stakes
- Complete safety for worker's hands
- Fully adjustable, uniform blow
- Lightest model only

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perature within a few seconds after the trigger control is touched. The thermostatic brain—heat-control thermostatic action (without the use of thermostats)—prevents iron from getting too cool for efficient soldering or too hot for tip safety. This thermostatic action is guaranteed for the life of the iron. A switch-controlled spotlight makes interior soldering easier and is invaluable for TV and radio repair men.

Soldering with a cigarette lighter

A new solder in paste form, trade named "Eutec-TinWeld" has been introduced by Eutectic Welding Alloys Corp., Dept. BB, 40-40 172 St. Flushing, N.Y.

Technically, the material has extremely thin flowing properties with the solder so carefully balanced with its accompanying flux that the high wettability and capillary action permit

MORE ROLLER BEARINGS PER MINUTE

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- Automatic
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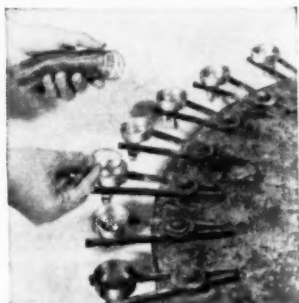
it to penetrate the tightest of joints.

The parts to be joined are painted with the solder paste and when heat (anything from a match to a blow torch) is applied TinWeld becomes liquid. When the liquid darkens, it is a sign the soldered joint is complete.

Notch-Coil Ring Design UPS Silver Brazing Rate 56%

SNAP-OFF COIL, drop-on assembly feature of job-designed, easy-to-handle preforms raised brazing rate of electrical transformer connectors from 360 to 560 units per hour . . . yet equipment and procedure were the same as used before with individual, machine-wound rings.

NOTCH - COIL PROJECTS rings in handling and storage. Tangling, distortion, breakage and loss are eliminated . . . $\pm .001$ -inch tolerances under all conditions minimize amount of precious alloys needed for job.



Coil-to-assembly in one fast and easy move. There's no tangling, distortion or material loss.

BUTT, LAP OR GAP rings are available in *any* size, in *Silfos* or *Easy-Flo*. Stress-relieved, rings snap snugly around outer diameters, snap into inner grooves for desired fill and strong, leak-proof bond.

Guaranteed count at no extra cost!

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Suburb of Milwaukee, Wis.

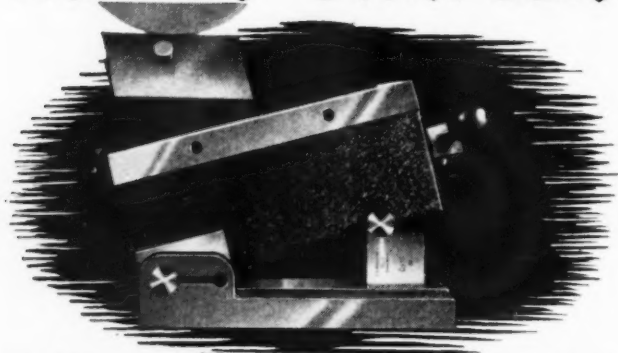
Diamond tools feature rustproof holders

An improved line of diamond tools featuring rustproof holders is now available from Diamonds and Tools, Inc., Dept. BB, 19345 John R Street, Detroit 3, Mich. All tool holders in the improved line are surfaced with an oxide coating that resists corrosion, thereby avoiding rust when held in stock or subjected to the action of corrosive coolants.

Diamonds are set in the holders with



FASTER-SIMPLER



POSITIVE ANGULAR ACCURACY



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For any angular set-up, whether single or compound, simply insert standard gauge blocks between the Magna-Sine plates. Proper gauge blocks are indicated in the Robbins Table of Constants. Positive accuracy in a few moments. Work is securely held by magnetic attraction. In two models and sizes; also non-magnetic models for inspection set-ups.



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Manufacturers of the MAGNA-SINE and Other Precision Tools

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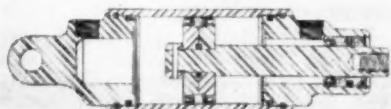
DETROIT 8, MICHIGAN

a special Colmonoy alloy. This alloy has a low melting temperature, good thermal conductivity, extreme wear resistance and low coefficient of expansion which approximates that of a diamond.

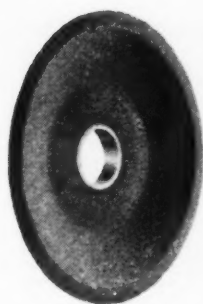
Key type pneumatic cylinders

Carter Controls, Inc., Dept. BB, 2800 Bernice Road, Lansing, Ill., announces the development and production of a new improved key type pneumatic cylinder.

A new unitized cartridge rod bearing



has been developed to both aid in servicing and reducing wear caused by misalignment. Included in the cartridge unit are a long bronze rod-end



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81-35A

bearing, rod packing, and a self centering packing at the pivot point. This cartridge can be replaced without disassembly of the cylinder, by removing a snap ring, pulling out the unitized bearing and dropping in a new cartridge. Sizes available are 1½" through 8" bores with a stroke of length up to 18 feet.

Imported fiber glass cloth

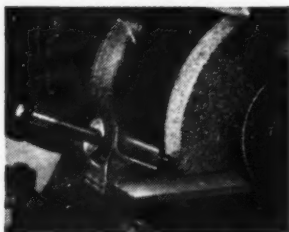
Reinforced plastic tools, jigs and fixtures are said to be now made eco-

nomically by using a newly developed, extremely thick weave of fiber glass cloth, nearly 1/10", which is available for the first time in the United States.

The glass cloth, Textiglass Style 7095A, available from Madagascar Graphite & Mica Co., Dept. BB, 92 Liberty St., New York 6, N.Y., is made from staple fiber yarn (ESE-2.5) and is in accordance with the following specifications: thickness, .09"; construction, 7x6; breaking strength—warp 400 lbs., filling 380 lbs.;



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DIAMOND WHEEL DRESSER

Mounted in fixture that accurately and evenly guides the diamond across abrasive wheel, and at the same time gives the diamond complete support. It eliminates vibration — reduces burning — increases grinding speed, accuracy and finish.

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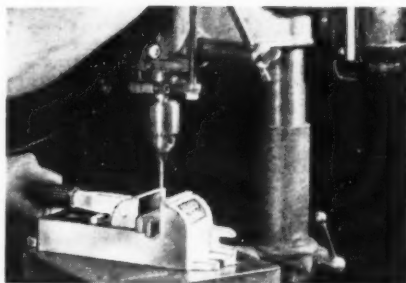
DETROIT 26, MICHIGAN

yards per standard roll, 23-25; weight per square yard, approx. 32 oz.

Quick acting holding device

Tech-Clamp Co., Inc., Dept. BB, 177 State St., Boston 9, Mass., announces its adjustable holding device claimed to be quick acting and efficient for any holding problem where a vise is needed.

The action is simple. Lift handle to retract jaw. Then press down to close





LANG Tool and Die Manufacturing Company, Glendale, California, uses Cerromatrix to anchor small punches in high-production lamination dies. They guarantee these dies for 2,000,000 blanks minimum.

Punches are held vertically by cap screws and mounted in Cerromatrix. Very small punches are held by circular washers outside and inside of punch, located in a $\frac{1}{4}$ " groove ground in the punch. All small punches are guided through a fixed stripper with Nitrided inserts. At least $\frac{1}{3}$ of the length of the punches is held in Cerromatrix. The photograph shows a die for rotor and stator blanks. It runs 135 strokes per minute. Eighty to eighty-five thousand blanks are obtained per sharpening of die. Send for literature.

Plan now to visit the Exposition of Basic Materials for Industry, June 15-19, 1953—Grand Central Palace, New York City.



CERRO DE PASCO CORPORATION

(formerly Cerro de Pasco Copper Corporation)

Dept. 7 - 40 Wall Street - New York 5, N. Y.

and lock the grip. Variable holding pressure is caused by varying the angle of the handle when clamping. Full movement of the handle will retract the jaw $1\frac{3}{4}$ ".

Shaft-mounted speed reduction drives

The American Pulley Co., 4200 Wisahickon Ave., Dept. BB, Philadelphia 29, Pa., originator of shaft mounted speed reducers, announces Shaft King,

a new series of 20 to 1 ratio speed reduction units featuring important improvements in gears, bearings, housing, lubrication and oil sealing systems.

Gearing in Shaft King speed reducers consists of two trains of the single helical type. Gears are precision cut from alloy steel forgings and are flame-hardened.

Gearing and bearings are continuously splash-lubricated by the high-speed gear and the counter-shaft pinion which run in a large oil reservoir in the lower third of the housing.

BOSTON UNIVERSAL ANGLE PLATE

A Precision Tool
that Holds Work
at Any Desired
Angle.



Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with vernier scale reading to 5 minutes.

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With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

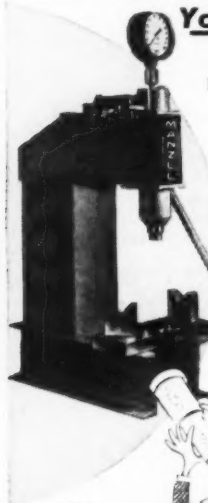
Made in several stock sizes. Write today for full information.

US AUTOMATIC BOX MACHINERY CO., Inc.

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The ARBOR PRESS

**You've Been
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It's the new Manzel 10 Ton Hydraulic Arbor Press...engineered to meet a variety of needs in manufacturing plants and automotive service stations. The long ram stroke and unusual depth and width of throat make it adaptable to straightening, material testing, bending, bearing or bushing work, and many other uses. Gauge is optional.

The press is portable...or can be permanently mounted on bench, column, or wall. Power unit operates 3 times faster. Ram is self-retracting. Write today for complete information.

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Jobber
inquiries welcome

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**PLASTIC-TIPPED MALLET WITH
REPLACEABLE (BY HAND) THREADED TIPS**

Now you can effectively avoid marring metal and plated finishes! Use Southwest Plastic-tipped mallets... the only plastic mallet with the threaded tips replaceable by hand. Plastic tips... solid alloy head threaded at both ends... non-sparking! non-magnetic! Since 1939 Southwest has led the field. Send today for illustrated literature and low prices. Send \$1.00 for sample prepaid mallet.

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**P. O. BOX 1615, DEPT. B
SANTA ANA, CALIFORNIA**

**Ardcor 35-ton air-operated
cutoff press offered as
complete package**

A 35-ton press, with air-operated clutch and brake, has been announced by American Roller Die Corp., 20500 St. Clair Avenue, Dept. BB, Cleveland 17, Ohio. The new Ardcor press was developed as a cutoff machine in conjunction with Ardcor cold rolling mills.

The clutch has a double cylinder. Each cylinder piston rod causes right- and left-hand acme nuts to rotate toward the flywheel and the flywheel cage. Each nut carries one aluminum shoe with a riveted lining. The spring-set, air-released brake is on the opposite end of the crankshaft. It is impossible for brake and clutch to be engaged simultaneously. Maintenance cost is greatly reduced because wear is virtually limited to the linings. Scoring is eliminated because rivet heads cannot come in contact with the discs. Discs are securely bolted in place, instead of floating in teeth or splines.

The basic actuating mechanism is so designed that linings are positively and automatically withdrawn from contact with the discs. Drag is thereby elim-



inated. Shoes and linings can be changed in minutes rather than hours. No special tools are required, and the

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METAL CUTTING MACHINES

If it's speed you need . . . **SawMore** Metal Cutting Machines are your first choice. **SawMore** Machines cut accurately. Operate at lowest cost.

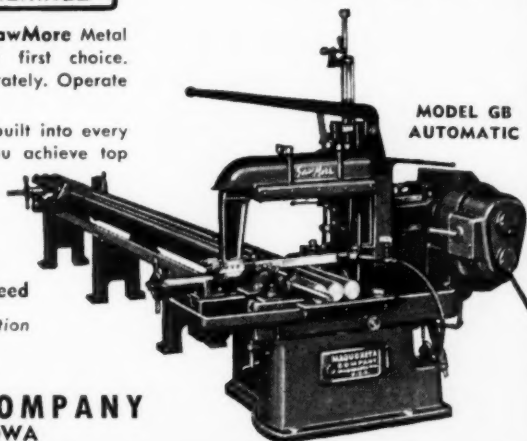
These highlight features—built into every **SawMore** Machine—help you achieve top production.

- Self-aligning blades
- Automatic feed
- Gears—constant mesh
- Positive compensating feed

Write for complete information
on the advantages of
SawMore Machines

MAQUOKETA COMPANY
CLINTON, IOWA

**FAST METAL CUTTING
... MADE EASY!**



unit does not have to be removed from the press.

The forged crankshaft is carried on double row Timken bearings, and the flywheel is on ball bearings.

The shut height adjustment is in the head of the press. To adjust, the lock-nuts on either side of the upper bolster plate are loosened and the adjusting screw under the dome cover is rotated. Alignment is assured by means of a center pilot. The press is supplied complete as shown with motor, belts, and all controls.

Machine makes double-chamfered machine screw nuts

The Jacobson Mfg. Co., Inc., Dept. BB, Kenilworth, N. J., announced recently that it has devised a specially constructed machine for mass producing double-chamfered machine screw nuts.

This high-speed, automatic machine is said to be capable of mass producing double-chamfered nuts at economical cost.

Conduit locknuts (UL approved), machine screw nuts (square and hexagon), electrical fixture nuts, and specials, to rigid specification, are currently being manufactured by Jacobson in steel, brass, aluminum and stainless steel.

Portelvator speeds paper sheeting operation

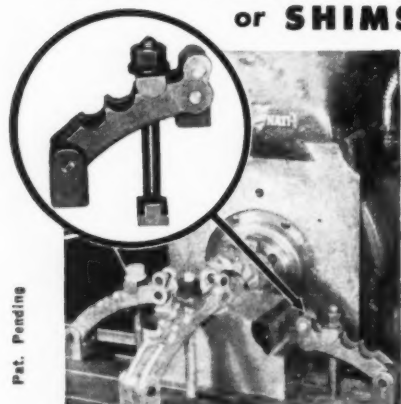
Installed in the basement, this long legged Portelvator, made by the Hamilton Tool Co., Dept. BB, Hamilton, Ohio, increases production of a ground floor paper sheeting machine by providing the means of handling six foot stacks of sheeted paper at the delivery end of the machine.

Operated by a 2 h.p. motor, with reversing magnetic starter, limit switch, and overload protection, the table is push-button operated for a total vertical travel of 78"; table size is 48"x84"; load capacity is 3 tons.

In operation, a skid is positioned on the platform of the Portelvator and the platform raised to maximum height, 30"

SAFE, RIGID CLAMPING

**without BLOCKS
or SHIMS**



UNIVERSAL CLAMPS

REVOLUTIONARY "universal action" of bowed arm design and forged construction provides absolute rigid clamping that won't work loose! No corrugations or serrations to wear down and allow slippage. UNIVERSAL Clamps quickly adapt to all T-slot work tables.

LOW COST, fool-proof clamps increase machine output up to 30%! Work pieces from paper thinness to 7½" are quickly clamped. Work-holding foot in horizontal position firmly grips narrow ledges or steps ... also round bar stock in V-blocks. Available in "production" and "tool room" models.

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**720 W. 12th Street
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through
modern design ...
**WORK
BENCHES**
at savings
of up to **40%**



and better quality, too!

New Sturdi-Bilt exclusive patented "Tension Bolting" revolutionizes work bench construction! Assures rigid, vibration-free frames, economical shipping, mass production and low cost. New type Sturdi-Bilt tops are warp and splinter-proof, dent and abrasion resistant, have twice the hardness of hardwoods, adjustable legs. Available with or without drawers in four sizes. For full details, specifications, prices, write for special Bulletin No. 327.

**USED AND APPROVED
BY LEADING COMPANIES**

Both Sturdi-Bilt work benches and the Shop Tender are being ordered and re-ordered in ever-increasing quantities by the Blue Book of American industry.

As Tool Tender
for machine units



For Maintenance
or Repair Work



For Laboratory
or Mailing Room



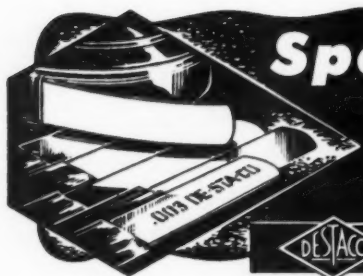
Available
with or with-
out tough,
long-wearing
wood top.

Versatile "Shop Tender"

Here's the perfect all 'round auxiliary bench. Mobile, convenient, sturdy, low cost—saves hundreds of steps; speeds up work and production. Adjusts to nine different heights. Has handy tool tray and steel drawer. Lower drawer and top frame are "Tension Bolted" for permanent rigidity. Available with wood top (24"x24"x1 3/4") with drop sides and back—or steel trays; 3" diameter hard rubber wheel sets or caster sets. Choice of 12 models. For full details, specifications, prices, write for special Bulletin No. 327-B.

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Steel Products, Inc.

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**FEELER
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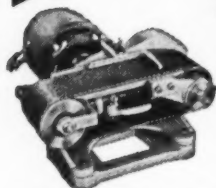
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DETROIT STAMPING COMPANY

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2



**SIMPLEX-M
ABRASIVE BAND
GRINDER**

The precision of a machine tool plus the durability of a workhorse. Complete with 1/2 H.P. Heavy Duty Motor and auto-

matic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

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and TRI-LOCK**

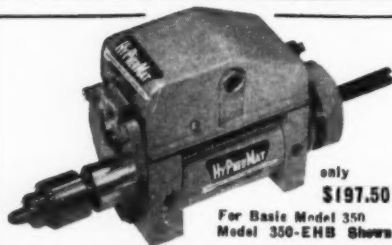
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HIGH SPEED DRILLING TAPPING UNIT

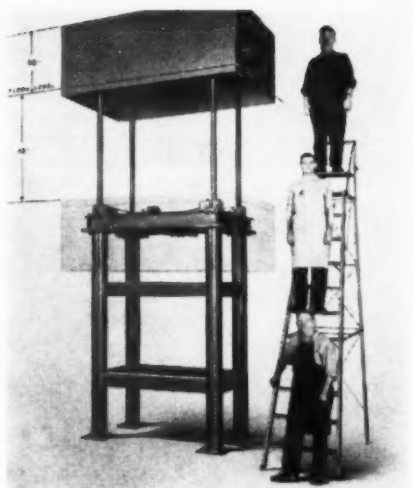
3.5" Stroke

.375" Drill or Tap Cap. in Steel

May be powered with shop air or low pressure hydraulics.

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HIGH PRODUCTION
DELIVERY FROM STOCK**

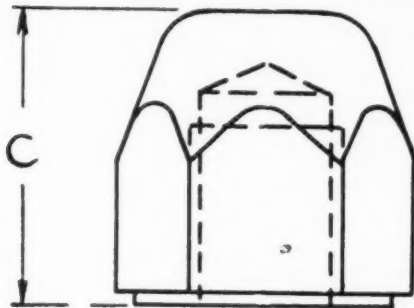
HYPNEUMAT INC., 647 W. Virginia St., Milwaukee 4, Wisconsin



above floor level. As sheets are received on the skid, the platform is lowered until it reaches its extreme low position, 48" below floor level, and then returned to floor level where a fork truck removes the stack to storage.

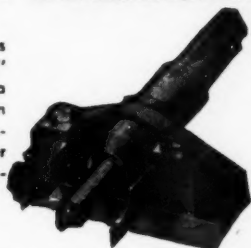
Acorn nuts

Acorn nuts for use in the construction of jigs, fixtures and other tooling applications is one of the new products in the line of tool components being made by Reid Tool Supply Co., Dept. BB, 709 Baker St., Muskegon Heights, Mich. They are made from hexagon cold finish steel, carefully machined and casehardened. The contact surface is square with the thread, zinc plated



Cut Costs on Hole-Cutting! USE THE NEW . . . BOREMASTER

Finished holes $1\frac{1}{2}$ " to $11\frac{3}{4}$ " diameter to a depth of 8" in one rapid operation on your present equipment!



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Industrial Diamonds

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Manufacturers of

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Prompt deliveries.

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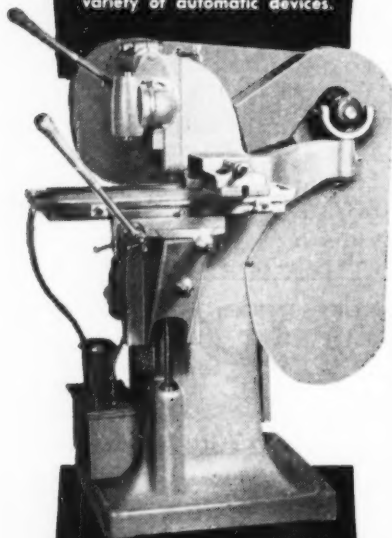
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are adaptable to specialized
production jobs with a
variety of automatic devices.



Our suggestions as to how a
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lar production needs, as well
as complete data on the basic
machine and attachments,
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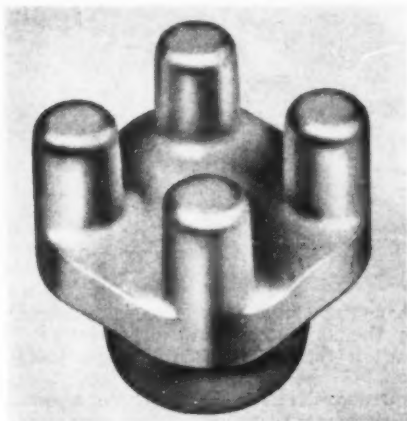
**United States
MACHINE TOOL CO.**

A Division of U. S.-BURKE MACHINE TOOL CO.
BROTHERTON ROAD 1, CINCINNATI 27, OHIO

for appearance and rust prevention. They are made in several sizes to cover the range of sizes normally required.

Bar knobs

Wespo bar knobs are used to replace standard knobs and hand wheels where stronger clamping action is necessary for dies, jigs, or fixtures, according to



the manufacturer, West Point Mfg. Co., 24931 W. 7 Mile Rd., Detroit 19, Mich.

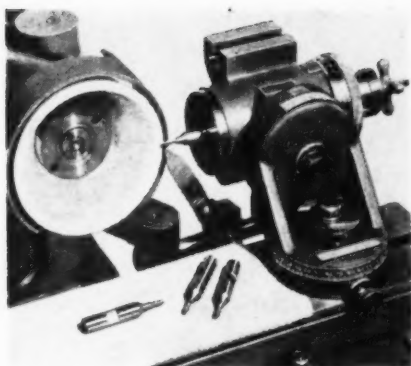
Bars inserted between the four prongs allow great leverage for tighter clamping. Wespo bar knobs are of sturdy malleable iron castings and come in a wide range of sizes. They can be had blank, drilled and reamed and tapped.

B & S adds 2 end mill sharpening attachments

Brown & Sharpe Mfg. Co., Dept. BB, Providence 1, R.I., has added 2 new end mill sharpening attachments for small end mills. The No. 5 and 10 N sharpening attachments are for use on the cutter and tool grinding machines of the same numbers, respectively.

In operation, the tooth being sharpened is held in contact with the tooth rest while feeding the cutter across the wheel by longitudinal table movement. A small knurled diameter at the end of the draw-in bolt gives sensitive control of the work.

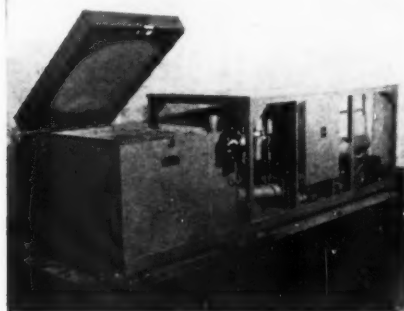
Setting to an angle in both a hori-



zontal and vertical plane, with rigid clamping provided for both adjustments, is possible. The No. 5 is shown; however, both are of the same type.

Units for cold treatment

Bowser Technical Refrigeration, Dept. BB, Terryville, Conn., has announced a

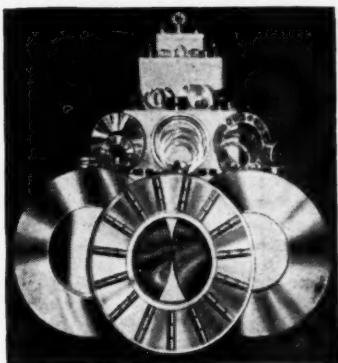


new line of units for the cold treatment of metals.

The new Bowser units have ranges from -50°F to -200°F , or lower.

Cutting tool life can be increased by as much as 500%, it is said, distortion and cracking resulting from grinding can be eliminated and dimensions of precision parts, gages and tools permanently stabilized.

Cold treatment improves expansion fitting, salvages out-of-size dies, increases hardness and lengthens life of carburized alloy gear steels, blanking



All Types of Thrust Bearings

We can make them up to 25" outside diameter. We are geared to handle all of your thrust bearing needs.

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68 STANLEY ST. NEW BRITAIN, CONN.

Hammond
WET or DRY
CARBIDE TOOL GRINDERS

Model WD-10 Wet
or Dry 10" Carbide
Tool Grinder.

HAMMOND Carbide Tool Grinders will soon pay for themselves through greater wheel economy, longer tool life and faster grinding.

AMERICA'S MOST COMPLETE LINE.

6", 7", 10", 14" Wet or Dry—also Chip Breaker and Diamond Finishing Grinders.

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You can order for **immediate shipment** from our stock 76 styles of punches and 65 styles of dies in round, flat, oval, and square sizes to fit most makes of presses.

Besides this saving of time, you save money. Send for our catalog sheets and check the lists of immediately available sizes and their prices.

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GROBET CHATTERLESS COUNTERSINKS

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in inch ounces
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(All sizes from 2-4000 ft. lbs.)

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P.A. Sturtevant CO.
ADDISON QUALITY ILLINOIS

and forming dies and plastic molding dies.

Wetproof Conduit

"Sealtite" flexible electrical conduit type UA made by the American Brass Co., Dept. BB, 25 Broadway, New York, N.Y., has Underwriters' Laboratories approval for use in wet locations. The tough, extruded synthetic covering over Sealtite Type UA's flexible metal core protects wiring against moisture, oil, dirt, chemicals, and corrosive fumes, on permanent and temporary installations. The conduit is made of spirally wound, interlocked zinc plated steel



strip with a copper bonding conductor wound spirally in the space between each convolution on the inside of the conduit.

Water-type coolant with wax marketed by Johnson's

A new water-type coolant that contains wax, for use in metal-working machines that use water-soluble coolants, has been developed in the industrial research laboratories of S. C. Johnson & Son, Inc., Dept. BB, Racine, Wis. The product is called "Johnson's No. 130 Wax-Cool."

Tests have proved that the new Johnson Wax development has exceptional lubricating properties and minimizes

1500° F. IN 5 MINUTES

Quick-Acting
JOHNSON
No. 120 Hi-Speed
FURNACE

\$145.50

F.O.B. Factory



2300° F. IN 30 MINUTES

Turn the heat on production. Heat treat carbon and high speed steels, dies and tools in your own plant with JOHNSON No. 120 Hi-Speed. Fast heat-up saves time and gas. Temperatures easily regulated with accuracy. Firebox: 5 x 7 $\frac{3}{4}$ x 13 $\frac{1}{2}$. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

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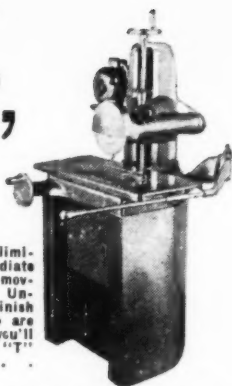
PENNSYLVANIA

Suits Your Grinding Needs to a

"T"



"T" Square action eliminates usual intermediate table on alternative moving spindle housing. Unusual accuracy and finish are obtained. There are other reasons why you'll like the Crosmen "T" Surface Grinder . . . because:



Here's a versatile, handy, accurate surface grinder. Just a few of the uses are: Chip breaker; grinding and sharpening carbide tools, sharpening straight and circular screw machine form tools, also circular file chisels, thread chaser and form surface grinder. Prompt Delivery!

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WESPO

T-BOLTS



**BOLSTER & T-SLOT
TYPES**

to J. I. C.

press room standards

Forged, precision machined
heat treated. Tensile
strength 150,000 lbs.

SIZES

BOLSTER BOLTS — dia. to 1½"
Heads sq. to 3" hex. to 2½"
T-Slot bolts, ½", ¾", 1" dia.
lengths to 12". 1" dia. 4" to 22"
long.

NUTS — hardened — threaded to
close fit. WASHERS — hardened
— ground both sides.

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For Assembling
Keyway Cutting
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Oil Grooving
Straightening
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And many other
jobs

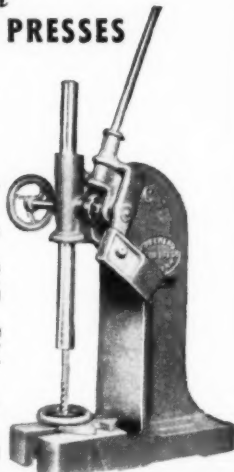
65 Standard styles
and sizes

From ¼ to 35 tons
pressure for manu-
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presses

From 1½ to 30
tons pressure for
motor driven hy-
draulic presses

Originators of the
Arbor Press

Send for Cat. 40-H



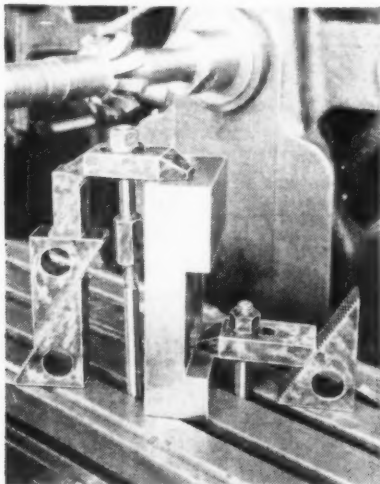
GREENERD ARBOR PRESS CO.
141 CROWN ST. • NASHUA, N.H.

heat at its source, it is claimed.

It is a wax-fortified water emulsion. It is sold as a concentrate and should be mixed with 20 parts of water before use. The product is packaged in 30- and 55-gallon drums.

Northwestern adds strap clamps

The Northwestern Tool & Eng. Co., 118 Hollier Ave., Dayton 3, Ohio, is



adding strap clamps to its line of setup tools. These clamps are designed for rigid clamping, beveled on the nose for cutter clearance and furnished in two types, plain and step.

They are available in lengths of 2½", 4" and 6" to handle from ⅜" to ¾" diameter studs.

New Molykote coating

Molykote M-88, a new dispersion of near colloidal particles of Molykote powder combined with an organic binder in a volatile solvent, has been announced by The Alpha Corp., 179 Hamilton Ave., Dept. BB, Greenwich, Conn.

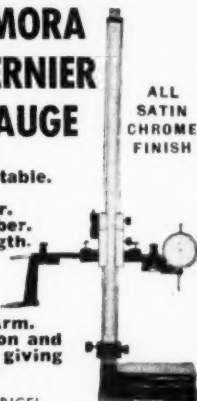
It may be applied to clean surfaces, metals or non-metallic materials, by spraying, brushing or dipping. The solvent will evaporate leaving a coating ranging from .0003" to .0007" in thickness.

For Absolute or Differential Measurement and Layout

THE NEW MORA MODERN VERNIER HEIGHT GAUGE

ALL
SATIN
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Greatest Precision.
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Heavy Upright.
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11" Long Rigid Scriber.
—Adjustable in length.
Figures on Scale
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Speeds up production and
inspection while giving
complete precision!



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Multiple Spindle Magazine Feed Power Screw Driving Machines

Latest type equipment for driving screws faster in products requiring two or more screws. These machines operate easily and require very little attention or adjustment once they are put in production.



Part Feeder

Automatic Part Feeders are adaptable to production jobs requiring the handling of small parts. Parts poured into hopper are arranged and fed down track in proper order. Send sample parts when writing for quotation.



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NEW SATIN CHROME
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12" to 36"

- LONG VERNIER SCALE
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- SATIN CHROME FINISH
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907 S. Victory Blvd. Burbank, Calif.

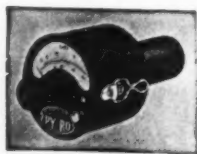
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KEYSEATER**

Portable — move directly to job; a time saver for both small and large shops.
3/4" stroke; adaptable for other work.
Low first cost — prompt delivery.
Good dealers wanted.
Reading Machine Co.
Cincinnati 37, Ohio



PYRO Radiation Pyrometer

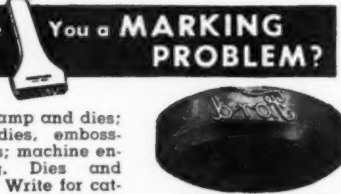
Determines spot temperatures of heat-treating furnaces, fire boxes, kilns and forgings accurately — instantly. No thermocouples, lead wires or accessories needed. Temperature is recorded on direct-reading dial at press of button. Two double ranges. Write for FREE Cat. No. 100.



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New Plant and Lab., Bergenfield 3, N. J.

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Steel stamp and dies; roller dies, embossing dies; machine engraving. Dies and Plates. Write for catalog.



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RIGHT HAND TAPS



| SIZE | THREAD | SIZE | THREAD | SIZE | THREAD |
|-------|-------------------------|---------|-------------------------------------|---------|---------------------------|
| 4 | 32-48-60-64 | 3/8 | 12-16-18-20-27-28-32-36-40-48 | 1-3/4 | 8-10-12-14-16-18-20-24 |
| 5 | 30-32-36-48-80 | 7/16 | 12-16-18-22-24-27-28-30-32-36-40 | 1-13/16 | 8-10-12-14-16-18-20 |
| 6 | 36-40-48-56-80 | 1/2 | 12-14-16-18-22-24-26-27-28-30-32-40 | 1-7/8 | 8-10-12-14-16-18-20-24 |
| 7 | 32-40 | | | 1-15/16 | 8-10-12-14-16-18-20-24-28 |
| 8 | 24-30-36-48-40-44-48 | 9/16 | 16-20-24-27-28-30-32-40-48 | 2 | 12-16-18-20 |
| 9 | 24-28-32-40 | 5/8 | 12-14-16-20-24-27-28-32-36-40 | 2-1/16 | 12-14 |
| 10 | 28-30-36-40-48-64 | 11/16 | 11-18-18-20-24-27-28-30-32 | 2-1/8 | 12-16-20 |
| 12 | 20-28-32-36 | 3/4 | 9-11-12-14-16-20-24-26-27-28-32 | 2-3/16 | 12-16 |
| 14 | 20-24-28 | 13/16 | 10-14-18-20-32 | 2-1/4 | 4-1/2-8-12-14-16-18 |
| 1/16 | 60-64 | 7/8 | 10-12-16-18-20-24-27-28-32 | 2-5/16 | 12-18 |
| 5/64 | 72 | 15/16 | 8-9-10-12-14-16-18-20-24-32 | 2-3/8 | 12-16-18 |
| 3/32 | 48 | 1 | 10-12-16-18-20-24-27-32-40 | 2-1/2 | 8-10-12 |
| 7/64 | 48-56 | 1-1/16 | 12-14-16-18-20-24 | 2-9/16 | 18 |
| 1/8 | 32-40 | 1-1/8 | 8-10-14-16-18-20-24-32 | 2-5/8 | 12-16-20 |
| 5/32 | 32-36-40 | 1-3/16 | 8-10-12-14-16-18-20-24 | 2-3/4 | 16 |
| 9/64 | 36-40 | 1-1/4 | 8-10-14-16-18-20-24-32 | 2-7/8 | 8-12-16 |
| 11/64 | 36 | 1-5/16 | 12-14-16-18-20-24-32 | 3 | 8-16 |
| 3/16 | 20-24-32 | 1-3/8 | 8-10-14-16-18-20-24 | 3-1/4 | 8-12-16 |
| 13/64 | 32 | 1-7/16 | 8-10-12-16-18-20-24 | 3-1/2 | 8-12-16 |
| 7/32 | 24-28-32 | 1-1/2 | 8-10-14-16-18-20-24-28 | 3-7/8 | 6 |
| 1/4 | 18-24-26-27-30-32-36-40 | 1-9/16 | 18-20-24 | 4 | 8-12 |
| 5/16 | 16-20-22-27-28-32-40 | 1-5/8 | 5 1/2-8-10-12-13-16-18-20-24 | | |
| | | 1-11/16 | 10-12-14-16-18-20-24 | | |

HIGH SPEED LEFT HAND TAPS

| SIZE | THREAD | SIZE | THREAD | SIZE | THREAD |
|------|----------------|-------|------------------|---------|-----------------------|
| 0 | 90 | 3/8 | 18-24-32 | 1-3/8 | 6-8-10-12-16-18-20-24 |
| 1 | 56-64-72 | 7/16 | 14-20-28 | 1-7/16 | 8-10-12-14-16-18-20 |
| 2 | 56-64 | 1/2 | 12-13-20-28 | 1-1/2 | 6-8-10-12-16-18-20 |
| 3 | 56 | 9/16 | 12-18-20-24 | 1-9/16 | 8-10-12-16-18-20 |
| 4 | 32-36-40-48 | 5/8 | 11-12-18-20-24 | 1-5/8 | 8-10-12-14-16-18-20 |
| 5 | 40-44 | 11/16 | 11-16-24 | 1-11/16 | 8-10-12-14-16-18-20 |
| 6 | 32-36-40 | 3/4 | 10-16-18-20 | 1-3/4 | 8-10-12-14-16-18-20 |
| 8 | 32-36-40 | 13/16 | 18 | 1-13/16 | 8-10-12-14-16-18-20 |
| 10 | 24-30-32-40 | 7/8 | 9-12-14-18-20 | 1-7/8 | 8-10-12-14-16-18-20 |
| 12 | 24-28-32 | 1 | 8-12-14-16-18-20 | 1-15/16 | 8-10-12-14-16-18-20 |
| 1/4 | 20-28-32 | 1-1/8 | 7-12 | 2 | 4 1/2-10-12 |
| 5/16 | 18-20-24-28-32 | 1-1/4 | 7-12-16-18 | | |

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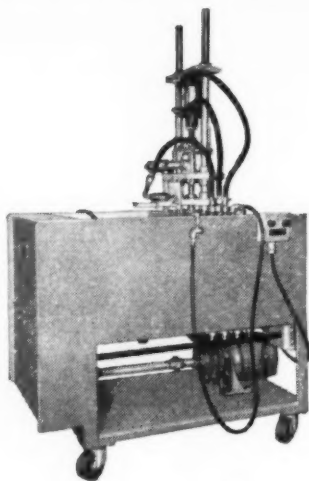
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New Machine Quenches Die Holes in Case Hardening

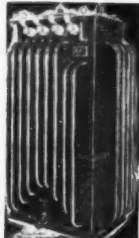
In announcing its new i.d. hole quencher, The Palmer Mfg. Co., 3790 Ridge Rd., Dept. BB, Cleveland, Ohio, claims that this machine puts into a scientific and automatic cycle of operations all those factors concerning temperature of the die, temperature of the coolant, timing of coolant exposure, etc., which heretofore has been a personal skill exercised by individual workers.

The heated die blank is placed into position on the anvil; air operated rams contact above and below, holding a fitting tightly against die. When proper contact is made, brine or other solution is pumped through die hole. When hole quenching is completed, depending on hardness required and area and depth of surface, a kick-out ram automatically pushes blank into tank for overall cooling. All timing, temperature and pumping operations can be set on a predetermined cycle and push button operated. This unit is adjustable to handle

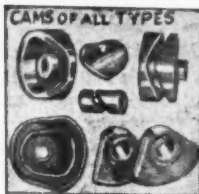


from $\frac{1}{8}$ " to 3" i.d. holes in blanks $\frac{1}{4}$ " to 8" o.d. and from $\frac{1}{8}$ " to 6" long.

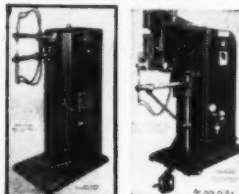
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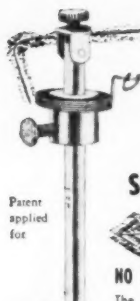


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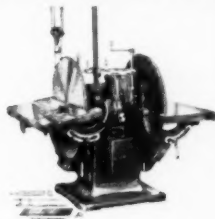
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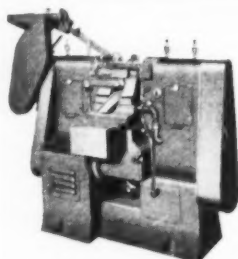
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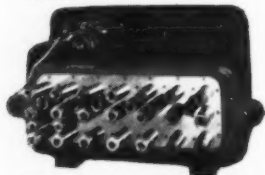
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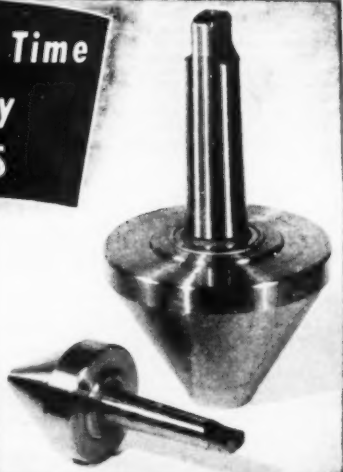
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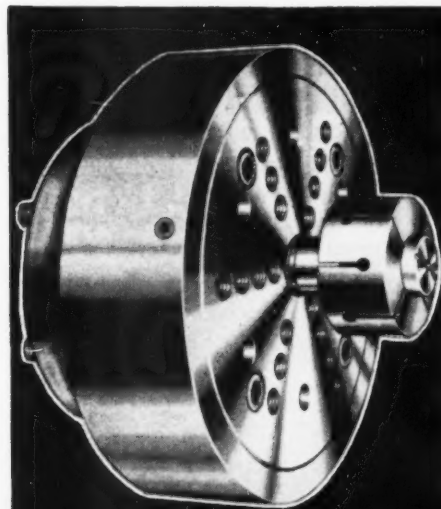
Single Spindle Automatic by New Britain

The New Britain Machine Co., Dept. BB, New Britain, Conn., has developed a single spindle bar machine that is claimed to be unusually flexible for all departments of a machine shop.

Features are: quicker setup; simpler camming; low cost; wide range of feeds; easily varied, wide range of spindle speeds; large work area; rigid construction; adequate power for carbides; chucking designed for hot rolled stock; ample chip clearance; large coolant capacity, simplicity, safety and economy of operation; small floor area and use of standard attachments.



It is said that the machine is so simple a novice can become a setup man in a relatively short time since the ma-



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chine can be changed from one job to another in 1¼ hours, average.

The universal turret cam provides an infinite variation in feed strokes up to 6¾" and preselection of 10 automatically changed turret feeds. There's stepless spindle speed variation from 80 to 1500 r.p.m.

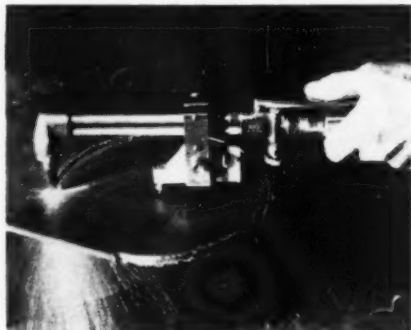
Three advantages include the program drum, automatic transmission with universal turret cam and standard cross slide wedge cams actuated by the turret motion. The drum houses the controls for cutting off, unchucking, stock feeding, etc. Five shifter arms on the program drum preselect any one of 10 possible turret feed gear ratios in the automatic transmission. Cross slide cams are sine bars or wedges mounted on the front of the turret. When it feeds forward, the wedges are moved ahead under the spherical rollers on the ends of the cross slide arms.

Guides developed for metal cutting torches

Development of a complete series of new, precision type cutting guides for

individual gas flame metal cutting torches, is announced by New Era Eng. Co., Dept. G-65, 458 W. 29th St., Chicago 16, Ill.

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guides are of three principal types: a small circle guide for cutting circles from 1" to 15" diameter; a large circle guide for circles 10" to 66" diameter. A

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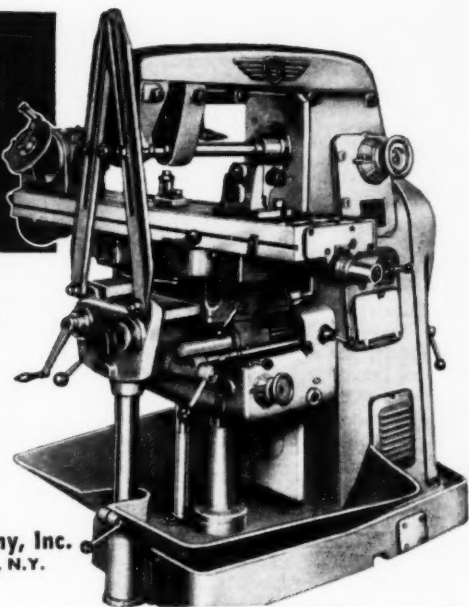
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158 Pioneer St., Brooklyn 31, N.Y.

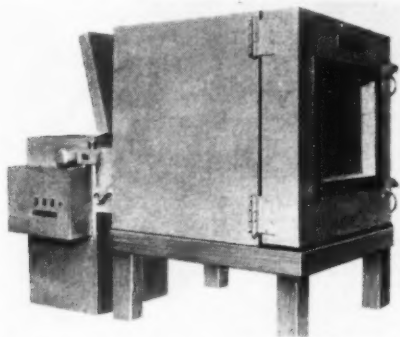
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straight line guide is available and can
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Tenney Eng. Inc., Dept. BB, 26 Ave.



B, Newark 5, N.J., announces a stand-

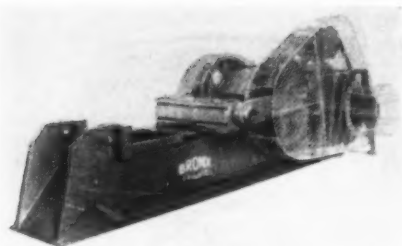
ard line of high and low temperature
environmental test equipment designed
to provide test conditions for the ma-
jority of all temperature testing re-
quirements.

Comprising two separate units, the
Tenney Servo unit and the Tenney
Companion test chamber, the equip-
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for conducting physical tests, weather-
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maintain relative humidity from am-
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English forming, bending machine

A 100 ton forming and bending ma-
chine manufactured by Bronx Eng.,
Stourbridge, England, is being offered
by British Industries Corp., Dept. BB,
164 Duane Street, New York 13, N.Y.

The Series B100 Bulldozer is espe-
cially designed for forming and bending
of warm stock. However, because of the
exceptionally rigid bed, cold forming



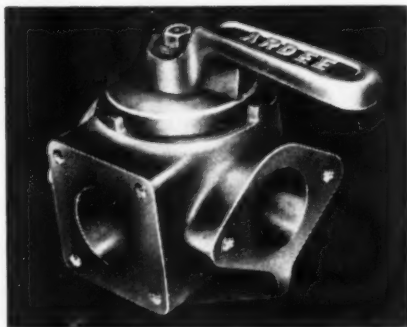
can be done up to the capacity of the machine.

A feature of the Bulldozer is that different tools may be set up on top of one another so that successive operations may be done in the same heat. Also, upsetting, punching and shearing are possible with a few small changes.

Recirculating valve

A recirculating valve that may be used for any stream dividing application of gases, air, salt water, oil and mild chemicals to 125 p.s.i. is being made by Ardee Mfg. Co., 840 N. Seward St., Los Angeles 38, Calif.

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BLACK GRANITE SURFACE PLATES

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NO MORE COSTLY JIGS

on small production jobs with
Troyke Worm Wheel Operated Tables



Size:
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See your dealer or write for Catalog No. 17.

Fully illustrated showing all models and applications to various work.



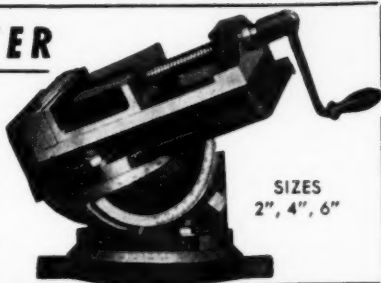
Drilling attachments can now be furnished for Worm Wheel Operated Tables.

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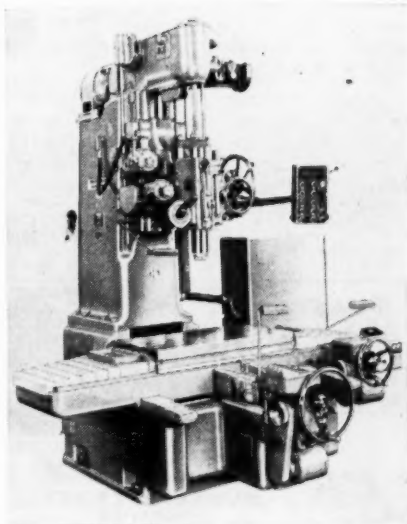


SIZES
2", 4", 6"

Pratt & Whitney adds No. 2E jig borer

The No. 2E jig borer has been added to the Electrolimit series of jig borers manufactured by Pratt & Whitney, Division Niles-Bement-Pond Co., Dept. BB, West Hartford 1, Conn. The new machine is designed for precision boring and milling; featuring the Electrolimit measuring system and the pre-loaded ball roll quill, the 2E is said to be capable of locating and machining to tenths.

The No. 2E employs two separate Electrolimit measuring units, one for longitudinal and the other for transverse movements. Both measuring units are independent of traversing screws. Each unit obtains basic 1" spacings electromagnetically from a solid notched master bar and registers a zero reading on an indicating meter without making physical contact. Fractional inches are obtained by moving a small electromagnetic head by means of a super precision micrometer head graduated for easy reading to .0001". Since a 1/32"



movement of the 4½" diameter thimble represents a setting change of .0001",

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... with full length bearing precision bushings, O.D. ground true to I.D. • We specialize in hole sizes #80 to ¾", in any body size. Other sizes to your specifications. Production small hole drilling, our specialty.

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MICRO DRILL GUIDE
AND ENGINEERING COMPANY • Detroit 35, Mich.
P.O. Box 5184, Southfield Sta.

smaller estimated settings are possible.

The precision preloaded ball roll quill roll feeds on 288 precision balls preloaded between the hardened quill and liner with a total bearing pressure of 6,000 lb. The stability of the ball roll quill makes milling feeds practical for the table and carriage.

The borer has electronically controlled milling feeds infinitely variable from 1" to 15" per minute. Rapid power travel of 60" per minute is also provided. There are eight selective spindle feeds ranging from .0005" to .015" per revolution, both up and down. Twelve spindle speeds ranging from 37 to 1800 r.p.m. are provided through a gear box and 4 speed motor.

Ample working space is provided with a 22 by 44 inch table; travel is 36" longitudinally and 22" transversely. Maximum height between table and spindle end is 27". Special columns, 6" or 10" higher than standard, can be furnished, increasing the machine height accordingly.

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Handles
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Floating carriage diameter measuring machines

Floating carriage diameter measuring machines are new additions to precision instruments offered by The Sheffield Corp., Dept. BB, Dayton 1, Ohio. They are available in three models of different capacities; up to 4" with 8" between centers, up to 7" with 12½" between centers and from 6" to 12" with 14" between centers. The machines are said to check all diametral thread ele-



ments simply and accurately, and not require the skill of a highly trained inspector.

In principle the machines consist of a sturdy cast iron base mounting two accurately aligned and adjustable centers. At right angles to the axis of the centers is a freely moving measuring carriage mounted on balls in vee ways and carrying a micrometer and highly sensitive reference point indi-



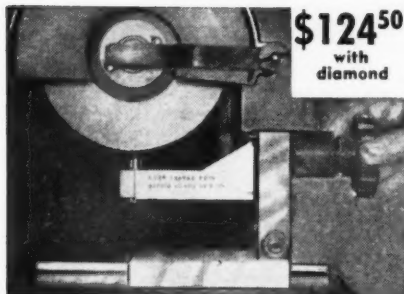
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cator. This carriage permits measurements to be taken along the center line and at right angles to the work.

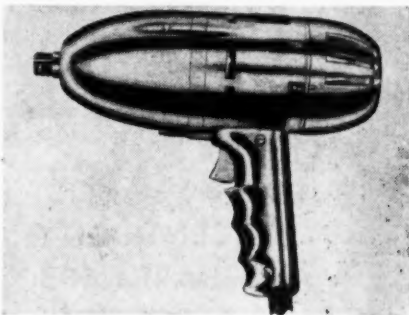
The micrometer unit has a large anti-glare matt chrome drum, with clearly defined graduations. A vernier scale enables direct readings to .00001". Non-rotating anvils are fitted to the micrometer in order to minimize wear at the point of contact. Reference point mechanical indicators enable the thread elements to be measured to within .00001".

Versatile impact tool

Said to be very versatile, the new electric impact tool made by Syntron Co., Dept. BB, Homer City, Pa., removes up to $\frac{5}{8}$ " bolts, is adaptable as a tapping and threading medium and can be used for ordinary drilling, masonry drilling and wood boring.

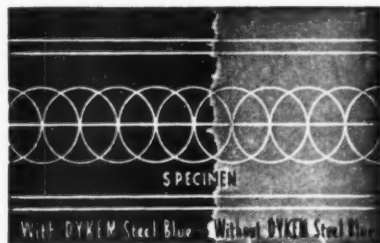
The motor runs continuously under all conditions and cannot be burned out, the manufacturer claims. This is due to the fact that the instant the torque load on the drive spindle builds

up to a certain point, the rotary action is changed, through the impact mechanism, into 2,000 sharp, powerful blows per minute. The normal clockwise ro-



tation can easily be changed by turning the rear end cap.

This tool weighs 6 $\frac{3}{4}$ lbs. and has a universal a.c., d.c. motor for 115 volt operation. A variety of accessories, such as sockets, bits, chuck adapters, etc., is available.



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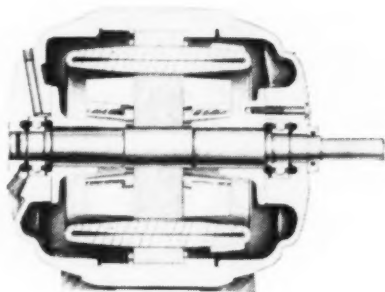
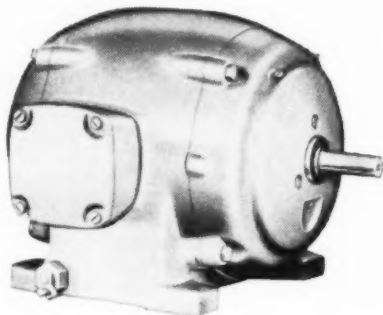
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BUSHINGS

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UNIVERSAL
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Enclosed, wetproof motors

A totally enclosed motor has just been developed by U. S. Electrical Motors, Inc., Box 2058, Dept. BB, Los Angeles 54, Calif., designated as Type SS. It is designed for services where dampness, dust, fire hazards and corrosive fumes are prevalent. Because of its construction, Type SS is self-cooling. This eliminates the use of an exterior



fan or heat-dissipating fins. The smooth exterior greatly lends itself to wiping off or hosing down, an important feature for motors to be used in dusty and dirty locations. Type SS is also provided with a slinger to protect the output shaft bearing against the entrance of dirt or water.

These motors are available in a range from 1/3 to 2 h.p. (also fan-cooled to 75 h.p.) and will later be produced in larger ratings.

Masonry drill permits continuous drilling

Dust packing which causes stalling is overcome by the unique design of a new masonry drill being introduced by Holub Industries, Inc., Dept. BB, Box 1007, Sycamore, Ill. It is claimed that the drill, called "Hi-Twist," can be used for continuous drilling of concrete, stone, brick, and similar masonry materials as well as copper, brass, and other soft metals.

The secret of dust removal is in the proper combination of oval flutes, nar-



row lands and fast spiral which carries the dust up and out of the hole as fast as it forms. As a result, less pressure is required and drilling can continue to desired depth without once removing drill to clean the hole. The drill can be used with any tool.

Sizes range from 11/64" to 1" for spiral fluted drills and 1-1/8" to 1-1/2" for straight fluted drills. They are also available in handy roll kits of three and four popular sizes.

Saw blades for stainless steel

The Henry G. Thompson & Son Co., Dept. BB, New Haven 5, Conn., manufacturers of Milford hack saw and band saw blades, announces blades made from a red-hardness high-speed steel. Several types of these Milford Reziator band saw blades (patent applied for) are designed primarily for production cut-off work and are particularly effective for cutting stainless steel, it is said.

Since not all of the current types of band saw machines are suited for use of this new high-speed steel blade, it will be introduced on a rental-performance basis under the control of the Thompson engineering staff until the design of more efficient machines makes possible its maximum performance. For the present, the sizes manufactured will be confined to 3/4" and 1" widths with 6 teeth per inch, in tempers suitable for specific applications.

April, 1953

BOYAR-SCHULTZ

Precision-made ALLOY STEEL T-SLOT BOLTS



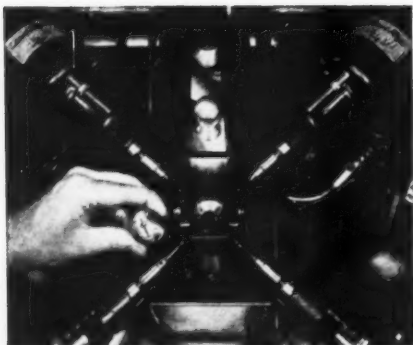
FOR MAXIMUM EFFICIENCY and PROLONGED MACHINE LIFE

It does not take long to ruin the accuracy of costly machine tools when poorly made, soft steel bolts of ordinary manufacture are used.

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When compared with refinishing and truing the bed of a machine tool, the cost of GOOD bolts is trifling. Write for Free Catalog.

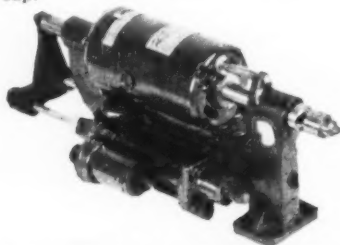
BOYAR-SCHULTZ CORPORATION
2108 Walnut Street, Chicago 12, Ill.



DRILLING SPEEDED AUTOMATICALLY

and at low cost with Electro-Mechano compact drill units. Typical set-up above is used by a Racine screw machine company; four units drill No. 50 holes in stainless steel fuel nozzle caps. Production was increased from 40 to 190 pieces per hour.

These fast acting complete drill units speed up many simple drilling jobs and simplify complicated multi-spindle jobs. Direct electric motor drive variable speed spindle provides 1000 to 10,000 or 2500 to 15,000 RPM; employs economical air feed with adjustable hydraulic rate control. Supplied in pad or column mount, with manual, electric or automatic trip; drill cap .004 to 156". Precision sensitive bench and floor models available up to 1/2" cap.



FOR SIMPLE OR COMPLICATED SET-UPS

get more information,
write for bulletin B109

THE ELECTRO-MECHANO CO.
263 EAST ERIE STREET
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Miniature pneumatic transmitter

A miniature pneumatic transmitter for measuring and transmitting readings of temperature, pressure, vacuum, differential pressure, and liquid level to recording, indicating, and controlling receivers, including miniature type receivers, has been announced by The Bristol Co., Dept. BB, Waterbury 20, Conn. Transmission is by means of air pressures of between 3 and 15 p.s.i. that



have a direct relation to the measured quantity.

This new type of transmitter, known as the Bristol Series 650 pneumatic transmitter, uses standard Bristol measuring elements and a simple transmitting mechanism with only one pivot and no flexures. The transmitter is sensitive to changes in the measured value, as little as 0.3% of range, including reversal.

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Puts actual load of 3000 KG on 10 mm. ball.

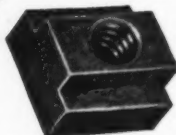
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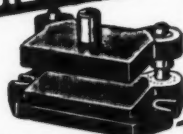
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TAKES WHEELS UP TO 1/2" x 4"
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Operating pressure 2000 PSI. Cap., 1.5 cu. in. per complete cycle... **12.75**

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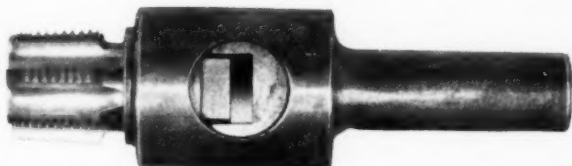
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PALLEY SUPPLY CO. 2263 E. VERNON AVE. Dept. MTB-4 LOS ANGELES 58, CALIF.

Stewart tap, tool holder

A new tap and tool holder being manufactured by R. W. Stewart Co., Dept. BB, 120 157th St., Calumet City, Ill., is said to hold alignment and gaging sizes whether used on straight or tapered shank.

The manufacturer says the holder is practicable for all size taps and that it



reduces tap and setting up costs considerably.

The MARKET PLACE

Advertisements acceptable in THE MARKET PLACE include those for employment, sales services, production facilities, representation and related needs. Rates: \$12 per column inch per insertion. Maximum size advertisement accepted in this section is two inches. Copy should reach us by the first of the month for next month's issue.

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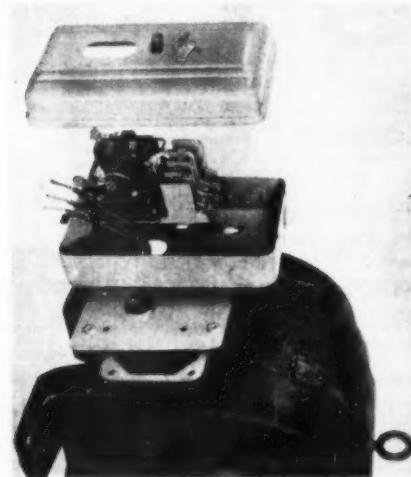
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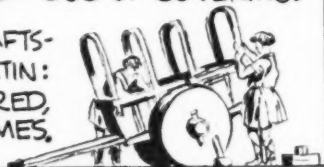
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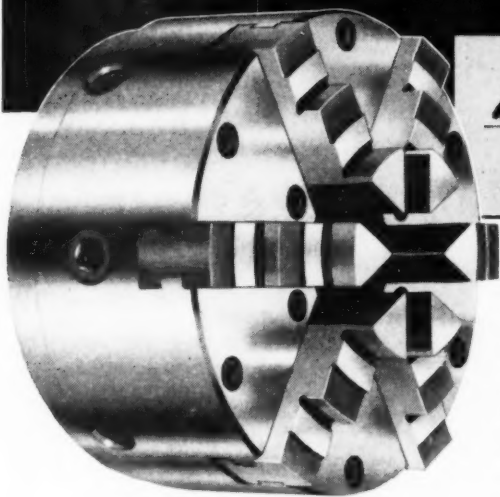
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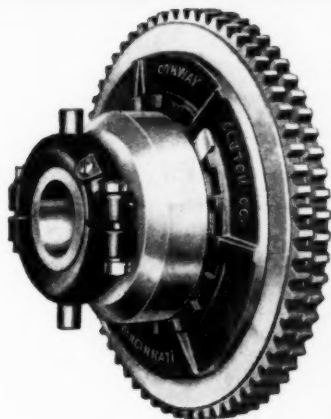
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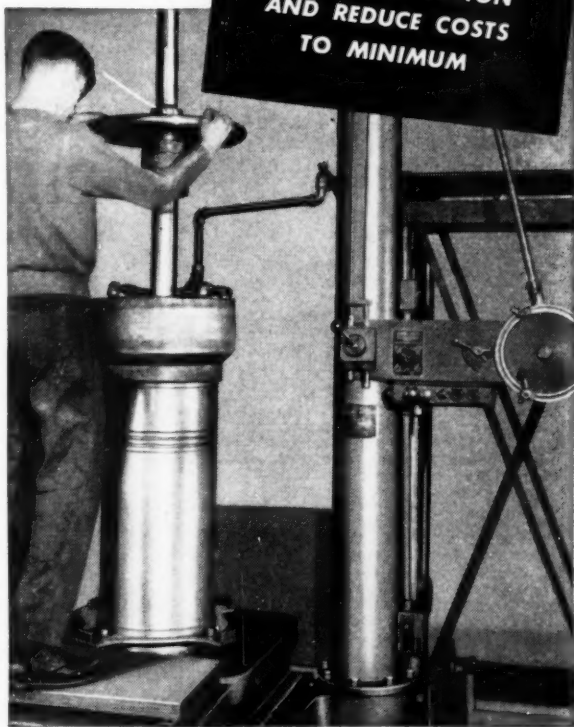


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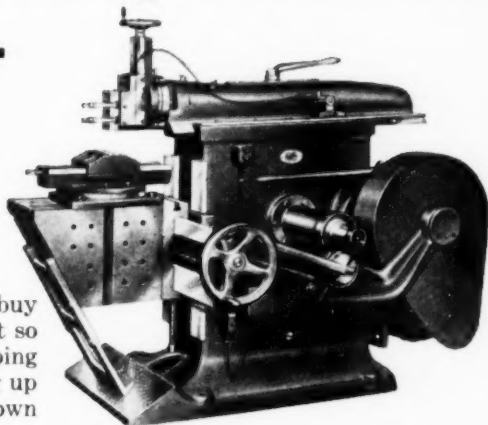
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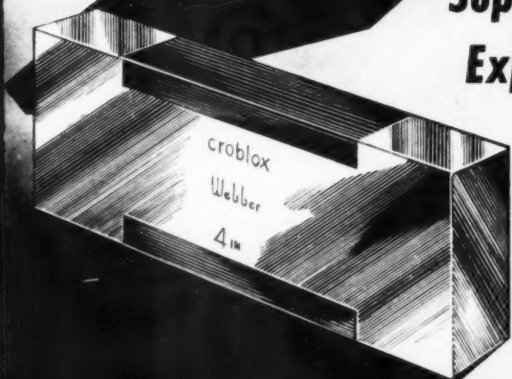
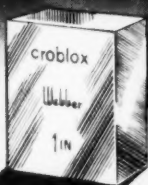
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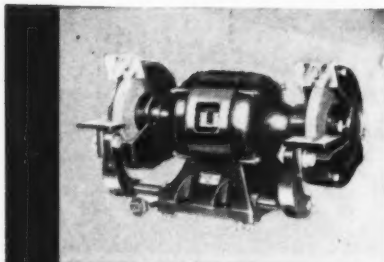
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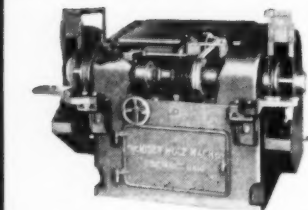
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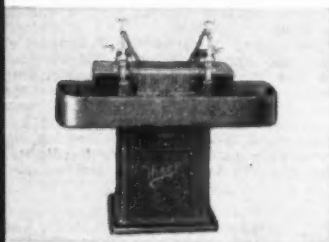
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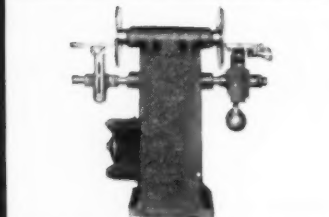
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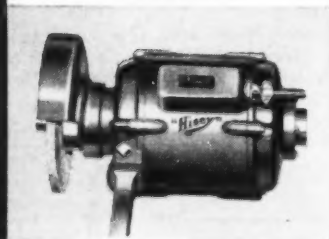
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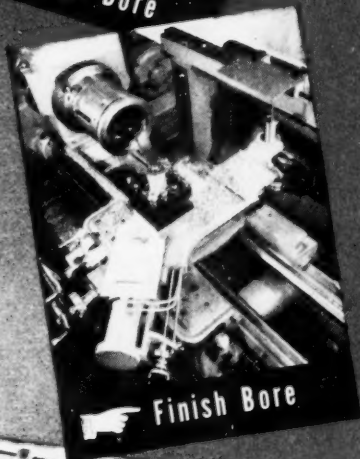
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